2018 eXtreme Science and Engineering Discovery Environment (XSEDE) Annual User Satisfaction Survey

Evaluation Report

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A. Document History

Relevant Sections	Version	Date	Changes	Author
Entire Document	0.9	08/25/2018	Base line document for project team review	J. Wernert
Entire Document	0.9.1	09/1/2017	Added additional analysis per comments/requests	J. Wernert
Section C.3	0.9.1	09/07/2017	Revised language and updated Table 5	J Wernert
Entire document	1.0	09/9/2017	Final review/edit/formatting	J. Wernert
Entire document	1.0	09/20/18	Formatting corrections	J Wernert
Tables 7, 8, 10, 11	1.0	01/17/19	Added cell coloring for improved readability	J Wernert

B. Document Scope

This document summarizes the responses to the 2018 XSEDE Annual Satisfaction Survey, planned in late 2017/early 2018 and conducted with XSEDE users from February 12-April, 16, 2018. This was the seventh survey of XSEDE users. It was designed as a tool to gauge broad, overall awareness and satisfaction with XSEDE activities and services — a basic "report card." Other surveys and feedback mechanisms are deployed throughout the project to gather more granular, point-of-service, and resource- and service-specific data.

As with any survey instrument or resulting report, one should exercise caution in inferring too much with regard to specific results, either positive or negative. The authors made every effort to accurately summarize and convey the survey results received so as to not introduce any bias. Nonetheless, readers should pay specific attention to the data collection methodology, especially sources of survey error, detailed in Section C.2. Moreover, readers should frame their interpretation of responses in the context of the respondent demographics detailed in Section C.4.

Please direct any questions regarding the methods used in the administration of this survey or the summarization of responses provided in this report to Julie Wernert at Indiana University, jwernert@iu.edu, or Lizanne DeStefano at the Georgia Institute of Technology, ldestefano6@gatech.edu.

C. 2017 XSEDE Annual User Satisfaction Survey Results

C.1 Executive Summary

This report provides an analysis of the 2018 eXtreme Science and Engineering Discovery Environment (XSEDE) Annual User Satisfaction Survey. Section C.2 describes the data collection methodology of the survey. The sample included 13 types of users with a sample size of 5000 (out of 17,448 users) with 1,107 respondents. The survey consisted of quantitative and qualitative questions designed to determine user awareness and satisfaction of XSEDE services and resources.

- The survey was available from February 12, through April 16, 2018. The overall response rate was 22.6%, up from the 2017 rate of response of just under 20%.

- Seventy-nine (79) percent of respondents indicated they had produced at least one product (as defined the NSF) in the last calendar year using XSEDE-associated and/or –operated resources.

- Some 87% report that XSEDE resources are *somewhat important* to *essential* in conducting their work.

- Underscoring the importance of XSEDE-associated or –operated resources, users indicate, among other negative effects, that the time required to finish projects would increase substantially; that the size and/or scope of their projects would decrease; and that the quality of results would likely suffer if it were not for access to XSEDE-associated and/or –operated resources.

- Awareness trended down slightly from 2017, but users remain broadly aware of XSEDE services and resources, with mean awareness scores generally greater than 3.0, on a 5-point scale.

    - The XSEDE website, the XSEDE User Portal, Computational Resources, Online Technical Documentation, and Help Desk Services have the highest levels of awareness among users.

    - When disaggregating by institution type, awareness among users from minority-serving institutions, as well as those affiliated with EPSCoR state institutions, was generally higher than respondents representing other institution types, when compared to the mean awareness for the full population.

    - When disaggregating by user type, center/non-research staff, center/research staff, and high-school users (0.29) report the highest levels of awareness.

    - Respondents remain somewhat unaware of resource personnel at their institutions able to assist with their use of XSEDE-related resources, with nearly 39% reporting they are unaware of *any* local support person.

- Similar to previous years, mean satisfaction outpaces awareness in most service areas, indicating those who use a particular service are in most cases *satisfied* to *very satisfied* with their experience.

- Data suggests that users are very satisfied with XSEDE resources and services, with mean satisfaction values significantly greater than 3.0 for all surveyed areas and greater than 4.0 in most areas.

- Excepting two modest decreases when compared to 2017 data, all areas reported higher levels of satisfaction in 2018.

- Users note the highest levels of satisfaction with the capability of batch computational resources (e.g., Stampede, Comet, Bridges), followed by capability (scalability) of XSEDE computational resources for simulation; the response time, effectiveness and availability of support and consulting services; and the XSEDE User Portal and Website.

- When disaggregating by institution type, satisfaction among users from minority-serving institutions, as well as those affiliated with teaching-focused institutions, was higher than respondents at other institution types when compared to the mean awareness for the full population.

- When disaggregating by user type, high-school users, government lab users, and faculty users report the highest levels of satisfaction.

- When examining training preferences by population type and/or role, preferences map closely to those of the overall population, with Web documentation and self-paced online tutorials being the most preferred methods. Data does not suggest that any particular field of study or professional role overwhelmingly affects one's preferred method of training delivery.

- Seventy-seven (77) percent of users describe their experience level as "somewhat experienced" or higher (3 or higher on a five-point scale).

    - The levels of experience reported in 2018 are on par with those reported in 2016, but somewhat down from 2017, interrupting the overall trend of an increasingly experienced user base.

- Demographic analysis indicates that the most typical XSEDE user is likely to be a white/non-Hispanic, male, working at a research-focused/doctoral-granting institution in the physics, biology, chemistry, engineering or computer science field.

- Section D of this report includes all open-ended question responses. Responses are categorized into themed categories and some comments may appear in multiple categories.

C.2 Data Collection Methodology

Sample Design

The target population for the 2018 XSEDE Annual Satisfaction Survey was active XSEDE users with an XSEDE portal account or an allocation; for purposes of this survey, "current" is defined has having accessed resources within the 24 months prior to survey deployment. (Prior to 2017, the sample was derived from the entire database of active portal IDs, regardless of when resources were last accessed.) The population includes 13 different types of users from across the United States conducting research at institutions in the academic, government, non-profit, and for-profit sectors. The aim is to produce a sample distribution that represents all thirteen groups of users in proportion to their distribution in the full user population.

XSEDE provided a list of the target population, which included a total of 17,448 XSEDE users who had accessed XSEDE-managed or –operated resources in the 24 months prior to survey deployment. The list included name, email address, institution, and user type. Upon receipt of the population list, in accordance with Indiana University Institutional Review Board (IRB) standards, it was stored in a secure database created and maintained by the Indiana University Center for Survey Research (CSR). The list was reviewed and corrected for any clerical errors and expunged of duplicate cases.

Prior to selecting the random sample of 5000, a full census was pulled for the following groups: center, non-research staff, high school users (student and faculty), industrial researchers, non-profit researchers, users marked as gender female, and users marked as American Indian/Alaska Native, Black/African-American, Native Hawaiian or Other Pacific Islander, Hispanic/Latino, or of a mixed race/ethnicity that includes one of the aforementioned race and ethnicity categories. The remaining 4,421 sample members were selected using proportionate, stratified sampling by sample type.

The rate of response was tracking much lower than for XSEDE17, so the population list was analyzed to attempt to identify issues that potentially should have been resolved before sampling. We found that 1,929 users in the sample were marked as never having run a job and should have been excluded from the eligible list for drawing the sample. Of those, 203 had already completed the survey, so they were kept as part of the sample. The remaining 1,726 in this group were marked as ineligible. These numbers are broken out in the "oversample" column in Table 1.

Additionally, the recurring issue of 3-5% of the sampled users with undeliverable email addresses persisted, with 187 cases returned as undeliverable. These cases were determined to be ineligible users and were replaced with 187 panel members (2014-2017 survey participants).

Sample distributions are illustrated in Table 1.

Table 1. Distribution of population and sample counts by sample type for the 2017 XSEDE Annual Satisfaction Survey

Sample Type	Population	Percentage of Population	Targeted Sample	Random Sample	Oversample	Total Sample	Percentage of Sample
Center Non-Research Staff	164	0.94%	58	0	104	162	2.41%
Center Research Staff	458	2.62%	51	63	49	163	2.42%
Faculty	2464	14.12%	230	271	368	869	12.92%
Government User	102	0.58%	43	0	53	96	1.43%
Graduate Student	8409	48.19%	1065	1330	730	3125	46.46%
High School User	168	0.96%	73	0	69	142	2.11%
Industrial User	59	0.34%	30	0	28	58	0.86%
Nonprofit User	86	0.49%	39	0	47	86	1.28%
Other/Unknown/Unaffiiated	340	1.95%	35	42	37	114	1.69%
Postdoctorate	1792	10.27%	296	283	129	708	10.53%
Undergraduate Student	2186	12.53%	258	325	186	769	11.43%
University Non-Research Staff	339	1.94%	32	38	46	116	1.72%
University Research Staff	881	5.05%	103	131	84	318	4.73%
Total	***17448***	***100.00%***	***2313***	***2483***	***1930***	***6726***	***100.00%***

Questionnaire and Email Message Development

The 31-item questionnaire was developed by the XSEDE project manager, Julie Wernert, in concert with XSEDE Evaluation Team members Lorna Rivera and Lizanne DeStefano. The original instrument was developed in 2013 and has been refined over subsequent years to reflect changes to resource and service offerings, to better align with reporting metrics, and to address new priorities and trends. In preparation for the 2018 cycle, throughout the fall of 2017, the XSEDE Evaluation Team extensively reviewed the survey instrument with each project area, as well as senior project leadership, the Program Officer, the XSEDE Advisory Board, and the XSEDE User Advisory Board. Through this process, several items were added for evaluation, others were retired, and a number of refinements were made to more closely align the services and resources being evaluated with the key performance indicators and reporting metrics used to evaluate the project.

After providing respondents with a detailed description of the purpose of the XSEDE survey and specific types of activities related to the survey administration, the first few survey questions asked about awareness of resources and services, the amount of time the respondent has been using XSEDE resources and services, and the frequency of use in the past year. The next set of items addressed satisfaction with resources and services and training preferences. New questions were added asking about products produced as a result of XSEDE resources/support and how work would be affected if XSEDE did not exist. Respondents were also asked to provide open-ended feedback and suggestions for improvement. The final section of the survey consisted of questions about the respondent's role and primary research field, institutional characteristics, and individual demographic characteristics, including gender and race. In accordance with Indiana University IRB guidance, all questions are optional and all responses remain confidential. Further, should a respondent choose to provide, or inadvertently disclose, personal contact information for additional follow up, this information is not associated with any survey responses.

An email invitation and reminder messages, based on those used since the project's inception, were developed and deployed for the 2018 administration, with minimal changes. The invitation

message includes a brief description of XSEDE and the survey's purpose, as well as information about data confidentiality and contact information for the XSEDE project manager, should the respondent have any questions or need further information. Following the survey invitation, seven reminder messages were composed with special emphasis on the importance of participation and how response data would be used to inform improvements to the services provided by XSEDE. Later reminders specifically highlighted the brief amount of time required to complete the survey. All messages contained a unique hyperlink to the web instrument, allowing each case to be tracked in the survey management database. The messages were formatted for HTML and plain text per recipients' email client using Arial Campaign software.

Section D contains the final questionnaire and the text of the email invitation and reminder messages.

Data Collection

The field period for the 2018 XSEDE Annual Satisfaction Survey was February 12, 2018 through April 16, 2018. An email invitation and seven reminders were sent to maximize participation.

The survey invitation was sent to all sample records with a valid email address. Reminder messages were sent to non-respondents and partials (those who had started the survey but had not yet completed it). The dates and total numbers sent for the email messages are detailed below in Table 2.

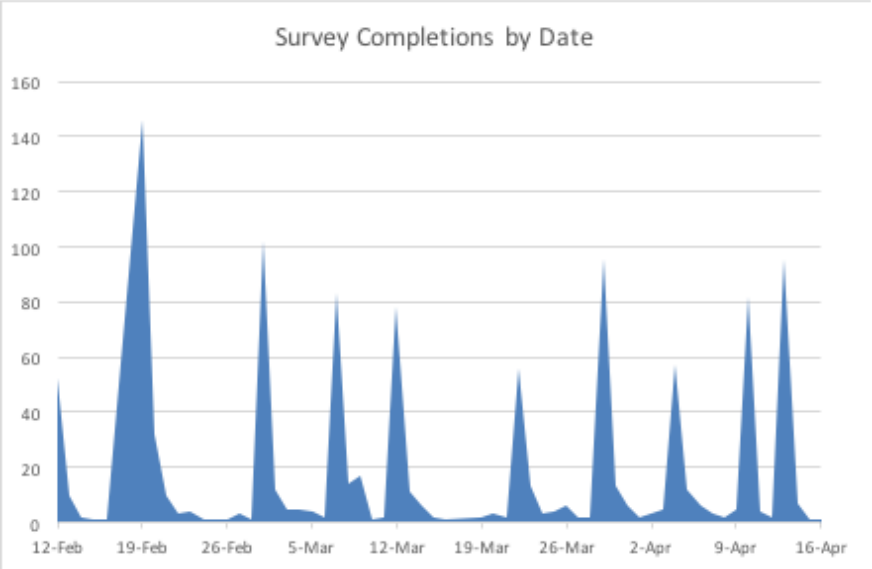
Table 2. Email Message Schedule and Number of Messages Sent for the 2017 XSEDE Annual Satisfaction Survey

Message	Date Sent	Number Sent
Invitation	2/12/18	5000
Reminder 1	2/19/18	4768
Reminder 2	3/1/18	4568
Reminder 3	3/7/18	4419
Invitation*	3/8/18	187
Reminder 4	3/12/18	4471
Invitation**/Reminder 5	3/22/18	4392
Reminder 1/Reminder 6	3/29/18	4211
Reminder 2	4/4/18	1663
Reminder 5/Reminder 4	4/10/18	4028
Final reminder	4/13/18	3801

*Invitation sent to 187 new sample cases to replace the returned/undeliverable cases.
**Invitation sent to 1,726 new sample cases to replace ineligible (not active) XSEDE users.

The dates on which the surveys were completed closely followed the schedule of emails sent, which is typical for web surveys. Survey responses were submitted steadily over the course of the administration period. The largest one-day increase was following the first reminder message when 16% of all survey responses were submitted. However, day-of (and next day) responses to the next three reminders remained consistent and accounted for 10%, 9%, and 8%, respectively, of all survey responses. Survey completions by date are presented in Figure 1.

Figure 1. Survey Completions by Date for the 2018 XSEDE Annual Satisfaction Survey



Final Dispositions and Response Rates

Final dispositions for all cases were classified according to The American Association for Public Opinion Research. 2015. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys. 8th edition.* AAPOR. The codes and definitions that were used for the 2018 XSEDE Annual Satisfaction Survey are listed in Table 3.

Table 3. AAPOR Codes and Disposition Definitions for the 2018 XSEDE Annual Satisfaction Survey

AAPOR Code	Disposition Definition
Interview (I)	**Complete** : Respondent completed the survey. Coded as 1.1 in data file.
Partial (P)	**Partial** : Partial or break-off with sufficient information (answered at least four survey items). Coded as 1.2 in data file.
Refusal (R)	**Refusal** : Sample member selected opt-out button on the survey or replied to the e-mail invitation or reminder stating that he or she did not want to participate.
Implicit refusal (R)	**Implicit Refusal** : Respondent consented to the survey but did not answer enough items to be considered a partial for this survey.
Unknown Eligibility, Non-Interview (UH)	**Nothing Returned** : Respondent did not respond to the survey; unknown if any e-mail messages were read.
Mailing returned/undeliverable (UO)	**Mailing Returned** : Recruitment message was not received by intended recipient due to e-mail and/or mailing returns.
Not eligible	**Not Eligible** : Sample member responded to recruitment with information indicating they were no longer eligible to participate (no longer at the current institution).

Table 4 itemizes final dispositions and the AAPOR Response Rates, RR2, for the 2018 XSEDE Annual Satisfaction Survey. The AAPOR Response Rate 2 is calculated as follows:

$$RR2 = \frac{(I+P)}{(I+P)+(R+NC+O)+(UH+UO)}$$

Table 4. Final Dispositions and Response Rates for the 2018 XSEDE Annual User Satisfaction Survey

Disposition (AAPOR Code in parentheses)	Count	AAPOR Response Rate 2
Interview (I)	965	**22.60%**
Partial (P)	142	
Refusal (R)	111	
Implicit Refusal (R)	75	
Nothing Returned (UH)	3631	
Mailing Returned (UO)	72	

Post-Survey Data Processing and Analysis

Final data preparation involved exporting the survey data from the SQL server and running specialized queries for data-cleaning. Numeric data were checked for inconsistencies such as illogical values or inappropriate missing data and then edited for variable labels and values. Missing values were coded as follows: 1) items respondents did not answer = 9999; 2) items not included in a respondent's survey path due to skip logic/branching = 9997; and 3) items respondents did not see due to dropping out of the survey = 9997. Cleaning of open-ended items involved the removal of words or phrases that could identify individuals; it also involved minimal editing for spelling and punctuation.

In addition to 52 cases in which the respondent consented to proceed in the survey but did not respond to any survey items, 23 cases were identified during post-survey data processing as potential implicit refusals. These cases included either no data or data only for up to three of the first four survey items, but no subsequent data. Since these cases did not provide data considered substantive, they were recoded from partial completions to implicit refusals. The final response rate was lowered from 22.6 percent (before the recodes) to 22.2 percent (after the recodes).

We believe that our sample and representation is robust, and the rate of response for 2018 was up from 2017, when the response rate was 20 percent, but still down from historical high marks. A number of factors may be influencing this trend, including:

- Survey fatigue – users anecdotally (and in text comments) report being over-surveyed, or that they believe the survey is too long
- In an effort to survey a broad range of users, some are more invested than others
- Project age - as project ages, some users may be less inclined to participate
- The drop in response generally correlates to national trends for web-based surveys, especially those without completion incentives

Qualitative analysis was conducted using Excel to categorize and code open-ended responses to three questions.

- What unique value did the XSEDE environment provide to you beyond enabling access to a computing resource? Responses were coded using the following seven themes: 1) Training/Education, 2) Community, Collaboration, Support, 3) Program Capabilities, Facilitating Research, 4) Access to Knowledge Base and Resources, 5) General, and 6) Not applicable.

- How could XSEDE be more useful to your research or educational program? (For example, are there new resources or services that would be useful? Are there new features or improvements to existing services that would be useful?) Responses were coded using the following seven themes: 1) Access to Resources, 2) Expanded/new resources, 3) Improved Functionality, 4) Allocation, 5) Training/Support, 6) General, and 7) Not applicable.

- Do you have any other suggestions or comments regarding XSEDE or the value derived from the National Science Foundation's investment in XSEDE? Responses were coded using the following eight themes: 1) Resources, Access, 2) Allocation, 3) NSF Funding, 4) Support and Services, 5) Contribution to Science/Research, 6) Abilities and Functionality, 7) General, and 8) Not applicable.

All open-ended, coded responses are provided in Section D.

Information Regarding Sources of Survey Error

Surveys of this kind are sometimes subject to types of inaccuracies for which precise estimates cannot be calculated. For example, findings may be influenced by events that take place while the survey is in the field. Events occurring since the time the surveys were completed could have changed the opinions reported here. Sometimes questions are inadvertently biased or misleading. The views of people who responded to the survey may not necessarily replicate the views of those who refused to respond to the survey.

C.3 Results

The following analysis is based on data collected from 1,107 active XSEDE users who completed, at minimum, the first four items of the survey. A summary of survey findings is presented in this report.

Overall Use and Respondent Profiles

General Profile of Respondents for the 2018 XSEDE Annual User Satisfaction Survey

- Largely similar to the profile of respondents in project years 1-6, 27% of respondents are faculty, 33% are graduate students, and nearly 17% are postdoctoral fellows. These categories comprised 77% percent of all respondents.
- Of those respondents indicating they had used XSEDE resources, just over 32% had been using XSEDE resources for less than one year. Nearly 27% had been using XSEDE resources for one to two years, and 38% had been using XSEDE resources for three or more years.
- Some 77% of respondents consider themselves *at least* somewhat experienced users of XSEDE resources.
- Consistent with 2017, 60% of respondents consider XSEDE resources ***essential*** for conducting their work. This percentage is down slightly from 2017, but remains from 51% in 2016.

Of the 1,107 respondents, 666, nearly 60 percent, are represented in two of the thirteen sample groups: faculty users and graduate students. Where appropriate, this report highlights differences between these two groups and the broader population.

Holding steady with 2017 results, some 87% of those responding indicate that XSEDE resources are *somewhat important* to *essential* in conducting their work, and fewer than 9% (remaining considerably lower than the 16% reported when this question was first asked in 2012) indicate XSEDE resources have a *neutral* effect on their outcomes. A small number of respondents, or 4.1%, report that using XSEDE resources is either *somewhat unimportant* to *not important at all* in carrying out their work. Table 5 presents historical mean importance scores and percentages since the project's inception.

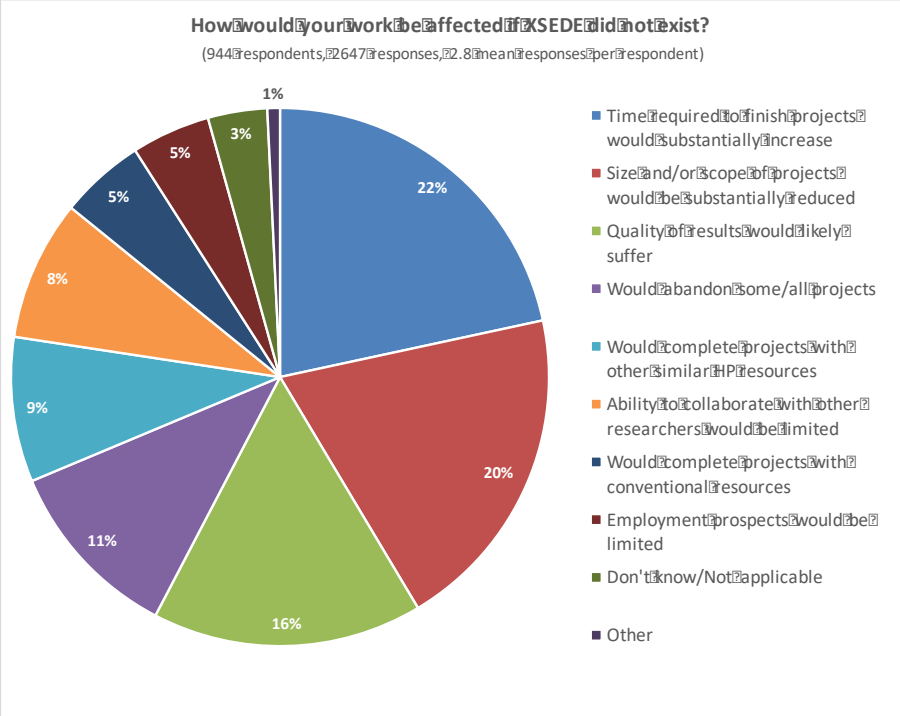
Table 5. Importance of XSEDE-associated or –operated resources (2012-18)

Importance of XSEDE-associated or operated resources in conducting your work (1=Not important at all, 5=Essential)									
Year	1	2	3	4	5	N	Mean	% of N=4 or 5	% of N=5
2012	2	9	59	129	174	373	4.24	81%	47%
2013	10	17	124	276	352	779	4.21	81%	45%
2014	5	15	111	383	539	1053	4.36	88%	51%
2015	12	17	119	418	552	1118	4.32	87%	49%
2016	4	12	84	338	513	951	4.41	89%	54%
2017	7	30	89	235	576	937	4.43	87%	61%
2018	8	33	84	273	599	997	4.43	87%	60%

Trending slightly below the overall population, when considering just faculty and graduate students (the two sample types with the highest percentage of responses), some 58% reported that XSEDE resources were "essential" in conducting their work. An additional one-quarter of faculty and graduate student respondents reported that the resources were "somewhat important" in conducting their work. Ninety-four percent of all respondents provided a response to this item.

Underscoring the importance of XSEDE-associated or –operated resources, users indicate, among other negative effects, that the time required to finish projects would increase substantially (22%), that the size and/or scope of their projects would decrease (20%), and that the quality of results would likely suffer (16%) if it were not for the XSEDE project. Figure 2 presents how user's work would be affected if the XSEDE project did not exist.

Figure 2. How user's work would be affected if the XSEDE project did not exist



Respondents remain somewhat unaware of resource personnel at their institutions able to assist with their use of XSEDE resources, with nearly 39% (up from 32% in 2017) indicating they are unaware of any local support person. Some 24% of users (down slightly from 25% in 2017) report awareness of an XSEDE Campus Champion, and fewer than 13% of users (on par with 12.6% in 2017) report being aware of an XSEDE staff member. Awareness of institutional IT support staff available to assist with the use of XSEDE resources fell slightly to 16.3% (from 16.7% in 2017.)

Continuing the trend established early in the project, respondents are far more likely to be aware of a colleague at their institution who is able to assist in their use of XSEDE resources, than of specific, dedicated support resources. Nearly 37% of respondents report being aware of colleague who can assist in their use of XSEDE resources, down from 44% in 2017.

Usage and Experience Level

Consistent with the experience levels reported in 2017, nearly 38% of all respondents report having used XSEDE resources for more than three years, with an additional 26% reporting one to two years of experience. Just over 32% indicate less than one year of experience using XSEDE resources, and less than 5% percent of respondents report that they had yet to use XSEDE resources.

In looking at all respondents, 23% self-describe their level of experience in using XSEDE resources as *not experienced at all* to *slightly inexperienced*, with 77% describing their experience level as *somewhat experienced* or higher (3 or higher on a five-point scale). The levels of experience reported in 2018 are on par with those reported in 2016, but somewhat down from 2017, interrupting the overall trend of an increasingly experienced user base. As noted, respondents self-describe their level of experience based on a subjective, self-interpreted scale; in the future we may want to define these experience levels to more consistently and objectively gauge where users are in terms of experience. Of the 666 faculty and graduate student respondents, 74% rated their level of experience using XSEDE resources as *somewhat experience*d or higher. This represents a 9% decrease from 2017.

In the past calendar year, respondents, on average, report using XSEDE computational systems:

- 0 times: 83, 7.7%
- 1-2 per year: 186, 17.2%
- Monthly: 227, 21%
- Weekly: 332, 30.7%
- Daily: 253, 23.4%

In the past calendar year, respondents, on average, report using XSEDE visualization resources:

- 0 times: 811, 75.2%
- 1-2 per year: 148, 13.7%
- Monthly: 67, 6.2%
- Weekly: 42, 3.9%
- Daily: 11, 1.0%

In the past calendar year, respondents, on average, report using XSEDE cloud resources:

- 0 times: 772, 71.7%
- 1-2 per year: 117, 10.9%
- Monthly: 86, 8.0%
- Weekly: 62, 5.8%
- Daily: 40, 3.7%

In the past calendar year, respondents, on average, report using XSEDE data resources:

- 0 times: 495, 45.9%
- 1-2 per year: 164, 15.2%
- Monthly: 177, 16.4%
- Weekly: 157, 14.6%
- Daily: 86, 8.0%

In the past calendar year, respondents, on average, report using XSEDE training resources:

- 0 times: 478, 44.4%
- 1-2 per year: 403, 37.4%
- Monthly: 147,13.6%
- Weekly: 39, 3.6%
- Daily: 10, 0.9%

In the past calendar year, respondents, on average, report using XSEDE User Portal:

- 0 times: 95, 8.8%
- 1-2 per year: 198, 18.4%
- Monthly: 354, 32.9%
- Weekly: 319, 29.6%
- Daily: 110, 10.2%

In the past calendar year, respondents, on average, report using XSEDE Website:

- 0 times: 62, 5.8%
- 1-2 per year: 202, 18.9%
- Monthly: 409, 38.2%
- Weekly: 309, 28.9%
- Daily: 88, 8.2%

Awareness of XSEDE Resources

Respondents were asked to rate their awareness of 20 XSEDE resource and service areas on a five-point scale, with 1 being *not aware at all* and 5 being *extremely aware*. In 2018, awareness trended slightly downward across most areas of the project. Only the XSEDE website (4.49 -> 4.54), online technical documentation (4.06 -> 4.17), and training opportunities (3.82 -> 3.85) experienced increases in awareness. Table 6 presents awareness means for all XSEDE resources and services evaluated.

Mapping closely to previous years' findings, the XSEDE website (4.54), the XSEDE User Portal (4.44), Computational Resources (4.29), Online Technical Documentation (4.17) and Help Desk Services (4.09) have the highest levels of awareness among users. As might be expected, newer, evolving services (e.g., Cloud Resources, Software Integration support, Resources Integration Support, etc.) have lower level levels of awareness, as do specialized services used by smaller subsets of the XSEDE population (e.g., Visualization Services, Science Gateways, Extended Collaborative Support Services, etc.) The factors informing lower-than-expected awareness might be explored through the use of targeted surveys or micro-surveys.

Table 6. Respondents' awareness of XSEDE resources and services

Please rate your awareness of XSEDE resources and services on a scale of 1 to 5, with 1 being "not at all aware/never heard of it" and 5 being "extremely aware" (1107 Total Cases)									
	Mean	Number of Applicable Responses	stribution (1 = completely unaware, 5 = completely aware)					Number providing no response	Histogram
			1	2	3	4	5		
Mission	3.58	1091	7.9%	11.0%	20.3%	36.3%	24.47%	16	
Computational resources	4.29	1096	0.4%	3.5%	9.5%	40.6%	46.08%	11	
Data storage services	3.79	1097	2.5%	8.2%	21.5%	43.1%	24.70%	10	
Visualization services	2.98	1102	12.3%	22.9%	28.6%	27.0%	9.17%	5	
Cloud resources	2.93	1106	16.1%	22.6%	25.4%	24.1%	11.75%	1	
Science gateways	3.05	1098	15.4%	18.6%	25.0%	27.7%	13.39%	9	
Campus Champion Program	2.90	1102	25.8%	17.2%	18.1%	19.2%	19.78%	5	
XSEDE user portal (portal.xsede.org)	4.44	1100	1.2%	3.5%	7.5%	25.9%	61.91%	7	
Data transfer services (e.g., Globus Online, GridFTP)	3.34	1101	14.4%	13.9%	20.1%	26.8%	24.80%	6	
XSEDE website (xsede.org)	4.54	1100	0.8%	2.0%	5.7%	25.6%	65.82%	7	
Training opportunities	3.85	1102	3.3%	8.2%	20.0%	37.5%	31.13%	5	
Online technical documentation	4.17	1102	2.2%	4.6%	15.0%	30.6%	47.64%	5	
Community engagement & enrichment opportunities	3.00	1104	15.0%	19.0%	28.4%	25.5%	11.96%	3	
Help desk services (help@xsede.org)	4.09	1099	3.6%	6.9%	13.9%	27.8%	47.68%	8	
Extended collaborative support services	2.82	1103	23.8%	19.4%	22.3%	19.7%	14.78%	4	
Sofware integration support	2.67	1103	24.4%	22.8%	24.1%	18.9%	9.88%	4	
Resource integration support (i.e., campus resources & cluster	2.36	1101	36.1%	21.6%	20.1%	14.6%	7.63%	6	
Software usage instrumentation support	2.50	1097	31.4%	21.2%	21.7%	16.7%	8.93%	10	
Software capabilites provided by XSEDE	3.32	1095	9.8%	15.0%	25.2%	33.2%	16.80%	12	
XSEDE single sign-on hub	4.01	1099	5.5%	7.6%	14.1%	26.1%	46.68%	8	

Among faculty and graduate students who responded to each item, the areas with the highest levels of awareness were Computational Resources (99%), the XSEDE User Portal (portal.xsede.org) (98%), and the XSEDE Website (xsede.org) (99%). Similar figures for Data Storage Services (97%), Online Technical Documentation (97%), Training Opportunities (95%), and Help Desk Services (95%). The awareness rating was lowest for Software Usage Integration Support (68%) and Resources Integration Support (62%).

While it should be expected that respondents at institutions providing HPC resources to the research community would be more aware of XSEDE resources, it is notable that, when disaggregating by institution type, awareness among users from minority-serving institutions, as well as those affiliated with EPSCoR state institutions, was generally higher than respondents representing other institution types when compared to the mean awareness for the full population (Table 7). When disaggregating by user type, center, non-research staff, center, research staff, faculty, and high-school users generally report the highest levels of awareness (Table 8).

Table 7. Awareness of XSEDE resources and services by institution type*

	Mean	EPSCOR State Institution	Minority-Serving Institution	Associate's College	Bacca-laureate College/Un	Master's College/Un	Doctoral-Granting Un	Teaching-focused	Research-focused	Govern-men Lab or Cent	HPC Resour Provider	Non-Profit Organi-zatio	Corporte or Industrial
Mission	**3.58**	3.81	4.00	3.31	3.41	3.56	3.64	3.61	3.65	3.66	3.99	3.67	3.27
Computational Resources	**4.29**	4.38	4.43	4.21	4.34	4.29	4.33	4.36	4.36	4.30	4.50	4.13	4.00
Data Storage Services	**3.79**	3.74	3.99	3.85	3.77	3.74	3.84	3.85	3.85	3.84	4.06	3.79	3.60
Visualization Services	**2.98**	3.07	3.41	3.21	2.83	2.86	2.99	3.04	2.88	2.98	3.29	3.04	2.60
Cloud Resources	**2.93**	2.96	3.13	2.93	2.86	2.87	2.88	2.97	2.87	2.81	3.26	3.13	2.47
Science Gateways	**3.05**	3.22	3.34	3.43	3.10	3.06	3.05	3.15	3.02	3.23	3.57	3.09	2.93
Campus Champions Program	**2.90**	3.36	3.57	3.07	2.89	2.87	2.94	3.07	2.94	2.84	3.32	2.83	2.27
Website (xsede.org)	**4.54**	4.59	4.56	4.43	4.62	4.57	4.60	4.58	4.63	4.56	4.77	4.71	4.33
User Portal	**4.44**	4.51	4.57	4.00	4.54	4.48	4.52	4.49	4.56	4.37	4.64	4.29	4.27
Online Technical Documentation	**4.17**	4.21	4.34	3.93	4.19	4.19	4.25	4.23	4.27	4.16	4.09	4.04	3.79
Training Opportunities	**3.85**	4.10	4.21	4.00	3.87	3.90	3.92	3.98	3.92	3.84	4.13	3.71	3.67
Community Engagement and Enrichment Opportunities	**3.00**	3.11	3.42	2.93	2.94	3.03	3.02	3.13	2.97	2.81	3.26	2.96	2.60
Help Desk Services (help@xsede.org)	**4.09**	4.13	4.36	3.92	4.06	4.05	4.15	4.23	4.18	4.23	4.22	4.13	4.13
Extended Collaborative Support Services (ECSS)	**2.82**	2.97	3.28	2.77	2.63	2.74	2.83	2.94	2.73	2.92	3.43	2.70	2.80
Data Storage Transfer Services	**3.34**	3.38	3.51	3.29	3.24	3.27	3.42	3.38	3.42	3.39	3.75	3.58	2.73
Software Integration Support	**2.67**	2.72	2.87	2.86	2.53	2.65	2.67	2.71	2.64	2.56	3.00	2.58	2.40
Resources Integration Support	**2.36**	2.39	2.37	2.36	2.07	2.21	2.33	2.29	2.23	2.21	2.70	2.08	2.13
Software Usage Instrumentation Support	**2.50**	2.66	2.55	2.50	2.31	2.49	2.53	2.52	2.46	2.42	2.83	2.17	2.20
Software capabilities provided XSEDE	**3.32**	3.38	3.63	3.07	3.31	3.27	3.35	3.40	3.35	3.23	3.46	2.88	3.00
XSEDE Single Sign-on Hub (login.xsede.org)	**4.01**	4.25	4.19	3.86	4.06	3.97	4.06	4.06	4.12	4.16	4.19	3.92	4.07

* Shading shows deviation of cell (institution type) score from mean score for the service or resource (in gray). Shading is computed separately for each row.

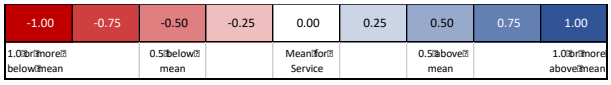


Table 8. Awareness of XSEDE resources and services by user type*

	Mean	Center, Non-Research Staff	Center, Research Staff	Faculty	Govern-mer User	Graduate Student	High School User	Corporate/ Industrial User	Non-profit User	Other	Post-Doctor Fellow	Undergrad Student	Univ, Non-research Staf	Univ, Research Staff
Mission	**3.58**	4.06	4.03	3.95	3.88	3.17	3.60	3.50	3.71	3.00	3.63	2.59	4.00	3.64
Computational Resources	**4.29**	4.41	4.51	4.40	4.17	4.11	4.20	4.18	4.29	4.00	4.35	4.24	4.29	4.43
Data Storage Services	**3.79**	3.81	4.15	3.94	3.63	3.65	3.60	3.75	3.90	3.33	3.89	3.29	3.52	3.77
Visualization Services	**2.98**	3.44	2.98	3.18	2.63	2.77	3.60	2.83	3.10	2.67	3.07	2.71	2.76	3.01
Cloud Resources	**2.93**	3.50	3.13	2.94	2.83	2.80	3.60	2.83	2.90	3.33	2.82	3.06	3.68	3.12
Science Gateways	**3.05**	3.63	3.40	3.18	3.13	2.81	4.00	3.17	2.75	2.83	3.01	3.12	3.60	3.19
Campus Champions Program	**2.90**	4.09	3.13	3.13	2.79	2.56	3.60	2.58	2.38	2.50	2.82	2.35	4.29	3.08
Website (xsede.org)	**4.54**	4.63	4.59	4.69	4.54	4.37	4.20	4.17	4.67	4.33	4.56	4.59	4.60	4.63
User Portal	**4.44**	4.47	4.53	4.61	4.33	4.24	3.80	4.25	4.24	4.33	4.58	4.47	4.54	4.45
Online Technical Documentation	**4.17**	4.28	4.40	4.30	4.04	3.95	3.60	3.75	4.25	3.50	4.38	3.94	4.24	4.26
Training Opportunities	**3.85**	4.09	4.21	3.96	3.83	3.64	4.00	4.00	3.76	3.17	3.94	3.47	4.08	3.99
Community Engagement and Enrichment Opportunities	**3.00**	3.25	3.25	3.15	2.75	2.81	3.60	2.92	2.76	3.17	3.06	2.76	2.92	3.17
Help Desk Services (help@xsede.org)	**4.09**	4.16	4.38	4.27	3.88	3.84	3.80	4.17	4.14	3.50	4.25	3.41	3.83	4.40
Extended Collaborative Support Services (ECSS)	**2.82**	3.78	3.20	3.02	2.79	2.46	3.60	2.83	2.67	2.50	2.80	2.24	2.96	3.38
Data Storage Transfer Services	**3.34**	4.06	3.75	3.32	3.33	3.13	3.60	3.00	3.33	2.83	3.44	2.65	3.67	3.72
Software Integration Support	**2.67**	3.03	3.00	2.74	2.46	2.55	3.60	2.67	2.48	2.67	2.70	2.59	2.40	2.77
Resources Integration Support	**2.36**	2.78	2.85	2.28	2.17	2.37	3.40	2.42	2.24	2.33	2.30	2.71	2.04	2.43
Software Usage Instrumentation Support	**2.50**	2.84	2.80	2.43	2.09	2.49	3.40	2.42	2.52	2.33	2.59	2.88	2.12	2.48
Software capabilities provided XSEDE	**3.32**	3.32	3.48	3.52	3.29	3.15	3.40	3.33	3.33	2.00	3.32	3.35	3.32	3.40
XSEDE Single Sign-on Hub (login.xsede.org)	**4.01**	4.35	4.30	4.15	4.17	3.79	4.20	4.42	4.14	3.83	4.05	3.88	4.24	3.92

*Shading shows deviation of cell (institution type) score from mean score for the service or resource (in gray). Shading is computed separately for each row.

-1.00	-0.75	-0.50	-0.25	0.00	0.25	0.50	0.75	1.00
1.00 or more below mean		0.50 below mean		Mean for Service		0.50 above mean		1.00 or more above mean

Satisfaction with XSEDE Services and Resources

The survey inquired about satisfaction with XSEDE services in 32 areas, as well as overall satisfaction with XSEDE (Table 9). Similar to previous years, mean satisfaction outpaces awareness in most service areas, indicating those who use a particular service are in most cases "satisfied" to "very satisfied" with their experience. All areas evaluated scored significantly above 3.0 (on a 5.0 scale), and, excepting two modest decreases when compared to 2017 data, all areas reported higher levels of satisfaction in 2018

Table 9. Respondents' satisfaction with XSEDE resources and services

Please rate your satisfaction with XSEDE services and activities. If you have no basis for rating your satisfaction, please select "Not Applicable."									
	Mean	Number of Applicable Responses	Distribution (1 = very unsatisfied, 5 = very satisfied)					N/A or No response provided	Histogram
			1	2	3	4	5		
Capability (scalability) of XSEDE computational resources for simulation	4.32	882	0.5%	1.9%	7.9%	44.8%	44.9%	225	
Capability (scalability) of XSEDE computational resources for data analysis	4.18	761	0.4%	1.8%	13.5%	48.1%	36.1%	346	
Capacity (in terms of high throughput computing) of computational resources for simulation	4.20	830	0.6%	2.4%	11.8%	46.7%	38.4%	277	
Capacity (in terms of high throughput computing) of computational resources for data analysis	4.10	722	0.3%	2.6%	17.7%	46.0%	33.4%	385	
Visualization facilities and rendering capabilities of XSEDE resources	3.75	364	0.8%	1.9%	40.1%	36.0%	21.2%	743	
Software capabilities for production computing	4.06	662	0.6%	1.4%	18.7%	49.8%	29.5%	445	
Capability of batch computational resources (e.g., Stampede, Comet, Bridges)	4.33	866	0.5%	2.1%	7.5%	44.3%	45.6%	241	
Capacity of interactive (cloud) computating and data analysis resources (e.g., Jetstream, Comet, Bridges)	3.98	476	0.4%	3.8%	21.4%	45.8%	28.6%	631	
Capacity of data storage resources (e.g., Wrangler, data storage)	3.96	568	0.5%	2.6%	23.4%	46.8%	26.6%	539	
Capability of data analytics resources (e.g., Wrangler Data Analytics Cluster)	3.82	333	0.6%	1.5%	36.3%	38.1%	23.4%	774	
Availability of tools, libraries, and software environments	4.17	892	0.6%	2.1%	11.3%	51.9%	34.1%	215	
Data archiving capabilities of XSEDE resources	4.00	670	0.6%	3.4%	19.0%	49.0%	28.1%	437	
Availability of support/consulting services	4.23	842	0.7%	2.1%	10.9%	46.3%	39.9%	265	
Response time of support/consulting services	4.29	832	1.0%	2.0%	9.1%	42.7%	45.2%	275	
Effectiveness of support/consulting services	4.28	832	0.6%	1.6%	10.7%	43.8%	43.4%	275	
Availability of extended collaborative support	4.06	485	0.4%	0.8%	23.1%	43.3%	32.4%	622	
Effectiveness of extended collaborative support	4.05	465	0.4%	1.3%	23.2%	42.8%	32.3%	642	
XSEDE website (xsede.org)	4.20	958	0.3%	1.6%	12.3%	49.8%	36.0%	149	
XSEDE User Portal (portal.xsede.org)	4.23	955	0.3%	1.8%	11.1%	48.4%	38.4%	152	
Online technical documentation	4.14	925	0.4%	2.7%	13.9%	48.2%	34.7%	182	
Range of training topics	3.99	705	0.4%	1.1%	23.0%	49.9%	25.5%	402	
Range of training delivery formats	3.91	667	0.3%	2.1%	25.8%	49.5%	22.3%	440	
Depth of training topics	3.87	668	0.4%	2.8%	28.0%	46.4%	22.3%	439	
Availability of training opportunities	3.95	695	0.9%	2.7%	22.7%	48.2%	25.5%	412	
Effectiveness of training	3.95	646	0.3%	2.2%	24.3%	48.9%	24.3%	461	
Help desk services (help@xsede.org)	4.30	836	0.1%	1.6%	11.1%	42.3%	44.9%	271	
Allocations submission process	4.08	852	0.9%	4.0%	13.6%	48.9%	32.5%	255	
Allocations review process	4.06	819	1.0%	2.6%	16.8%	48.7%	30.9%	288	
Allocations awards process	4.05	800	1.1%	3.3%	16.3%	47.9%	31.5%	307	
Data transfer services (e.g., Globus Online, GridFTP)	4.02	637	1.3%	1.1%	22.3%	44.7%	30.6%	470	
XSEDE single sign-on hub	4.15	828	0.8%	2.1%	14.9%	45.3%	37.0%	279	
Functionality of toolkits for campus cyberinfrastructure (e.g., XCBC, XNIT)	3.86	320	0.3%	0.9%	33.8%	42.2%	22.8%	787	
Overall satisfaction with XSEDE	4.28	879	0.7%	2.0%	10.0%	43.6%	43.7%	228	

Users note the highest levels of satisfaction with the capability of batch computational resources (e.g., Stampede, Comet, Bridges) (4.33), followed by capability (scalability) of XSEDE computational resources for simulation (4.32), the response time (4.29), effectiveness (4.28) and availability (4.23) of support and consulting services; and the XSEDE User Portal (4.23) and Website (4.20).

When disaggregating by institution type (Table 10), satisfaction among users from minority-serving institutions, as well as those affiliated with teaching-focused institutions, was generally higher than respondents at other institution types when compared to the mean awareness for the full population. When disaggregating by user type (Table 11), high-school users, government lab users and faculty users report the highest levels of satisfaction.

Table 10. Satisfaction with XSEDE resources and services by institution type*

	Mean	EPSCOR State Institution	Minority-Serving Institution	Associate's College	Baccalaureate College/Univ	Master's College/Univ	Doctoral-Granting Univ	Teaching-focused	Research-focused	Government Lab or Center	HPC Resource Provider	Non-Profit Organization	Corporate or Industrial
Capability of computational resources for simulation	**4.32**	4.20	4.52	4.30	4.31	4.30	4.33	4.38	4.38	4.23	4.35	4.29	4.08
Capability computational resources for data analysis	**4.18**	4.04	4.31	4.09	4.16	4.19	4.17	4.14	4.22	4.12	4.14	4.19	3.80
Capacity of computational resources for simulation	**4.2**	4.16	4.49	4.42	4.29	4.26	4.22	4.34	4.27	4.15	4.23	4.18	3.90
Capacity of computational resources for data analysis	**4.10**	3.96	4.37	4.17	4.13	4.17	4.10	4.14	4.15	4.03	4.13	4.13	3.78
Visualization facilities and rendering capabilities	**3.75**	3.79	3.92	3.14	3.68	3.69	3.71	3.79	3.73	3.93	3.83	3.63	3.50
Software capabilities for production computing	**4.06**	3.90	4.30	4.11	4.07	4.08	4.08	4.18	4.10	3.97	3.98	3.80	4.00
Capability of batch computational resources	**4.33**	4.30	4.58	4.50	4.44	4.44	4.35	4.45	4.39	4.29	4.35	4.12	4.08
Capacity of interactive (cloud) computational & data analysis resources	**3.98**	3.88	4.03	3.75	3.98	3.96	4.00	4.05	4.02	4.15	4.08	3.91	3.29
Capacity of data storage resources	**3.96**	3.92	4.24	4.17	4.06	4.03	3.98	4.02	4.00	4.21	3.69	4.00	3.75
Capability of data analytics resources	**3.82**	3.83	3.95	3.80	3.71	3.73	3.85	3.78	3.84	4.13	3.68	3.57	3.33
Availability of tools, libraries, and software environments	**4.17**	4.05	4.32	4.00	4.18	4.16	4.17	4.22	4.23	4.08	4.16	3.80	3.85
Data archiving capabilities of resources	**4.00**	3.76	4.16	4.14	4.01	3.99	3.99	4.04	4.04	4.16	3.97	3.93	3.88
Availability of support/consulting services	**4.23**	4.08	4.32	3.90	4.22	4.22	4.20	4.31	4.26	4.24	4.27	4.25	4.00
Response time of support/consulting services	**4.29**	4.31	4.46	4.00	4.31	4.28	4.27	4.38	4.31	4.19	4.32	4.16	4.10
Effectiveness of support/consulting services	**4.28**	4.17	4.38	4.17	4.31	4.24	4.27	4.34	4.30	4.15	4.33	4.16	3.90
Availability of extended collaborative support	**4.06**	3.90	4.37	4.00	4.09	4.07	4.03	4.17	4.02	4.10	4.18	4.00	3.60
Effectiveness of extended collaborative support	**4.05**	3.86	4.36	4.00	4.07	4.04	4.02	4.11	3.99	4.19	4.22	3.91	4.00
Web Site (xsede.org)	**4.20**	4.13	4.33	4.00	4.19	4.21	4.18	4.20	4.23	4.07	4.13	4.22	4.23
User Portal	**4.23**	4.22	4.34	4.00	4.24	4.26	4.22	4.23	4.27	4.10	4.21	4.23	4.08
Online Technical Documentation	**4.14**	4.12	4.28	4.08	4.10	4.10	4.13	4.17	4.15	4.09	3.91	3.87	4.00
Range of training topics	**3.99**	4.03	4.17	3.89	3.99	4.05	3.97	4.01	3.98	4.05	3.98	3.83	3.88
Range of training delivery formats	**3.91**	3.96	4.09	4.14	3.88	3.93	3.87	3.96	3.87	3.97	3.84	3.73	3.83
Depth of training topics	**3.87**	4.00	4.00	3.75	3.85	3.90	3.82	3.92	3.83	3.97	3.90	3.92	3.83
Availability of training opportunities	**3.95**	3.97	4.15	3.78	3.96	3.99	3.92	4.03	3.90	4.02	3.98	3.79	3.86
Effectiveness of training	**3.95**	4.05	4.15	3.88	4.03	4.01	3.92	4.05	3.96	4.03	3.94	4.00	3.57
Help Desk Services (help@xsede.org)	**4.30**	4.20	4.45	4.27	4.33	4.30	4.30	4.34	4.36	4.31	4.32	4.22	4.20
Allocations Submission Process	**4.08**	4.21	4.28	3.90	4.09	4.09	4.07	4.12	4.12	3.96	4.06	4.05	3.70
Allocations Review Process	**4.06**	4.15	4.33	3.80	4.13	4.15	4.04	4.17	4.08	3.98	4.09	4.11	3.75
Allocations Award Process	**4.05**	4.20	4.38	3.70	4.19	4.18	4.02	4.16	4.08	3.84	3.91	4.11	3.78
Data Transfer Services	**4.02**	3.98	4.15	3.90	4.12	4.15	4.05	4.08	4.07	3.95	3.87	4.00	3.00
XSEDE Single Sign-on Hub (login.xsede.org)	**4.15**	4.10	4.24	4.00	4.20	4.18	4.17	4.27	4.19	4.27	4.16	4.00	4.08
Functionality of toolkits for campus cyberinfrastructure	**3.86**	3.68	4.06	3.83	3.71	3.77	3.86	3.93	3.85	4.00	4.05	3.67	4.00
Overall satisfaction with XSEDE	**4.28**	4.25	4.60	4.45	4.30	4.33	4.26	4.32	4.32	4.20	4.36	4.09	4.07

* Shading shows deviation of cell (institution type) score from mean score for the service or resource (in gray). Shading is computed separately for each row.

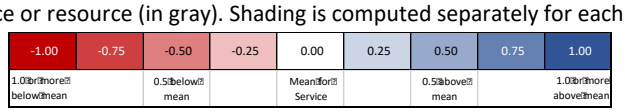


Table 11. Satisfaction with XSEDE resources and services by user type*

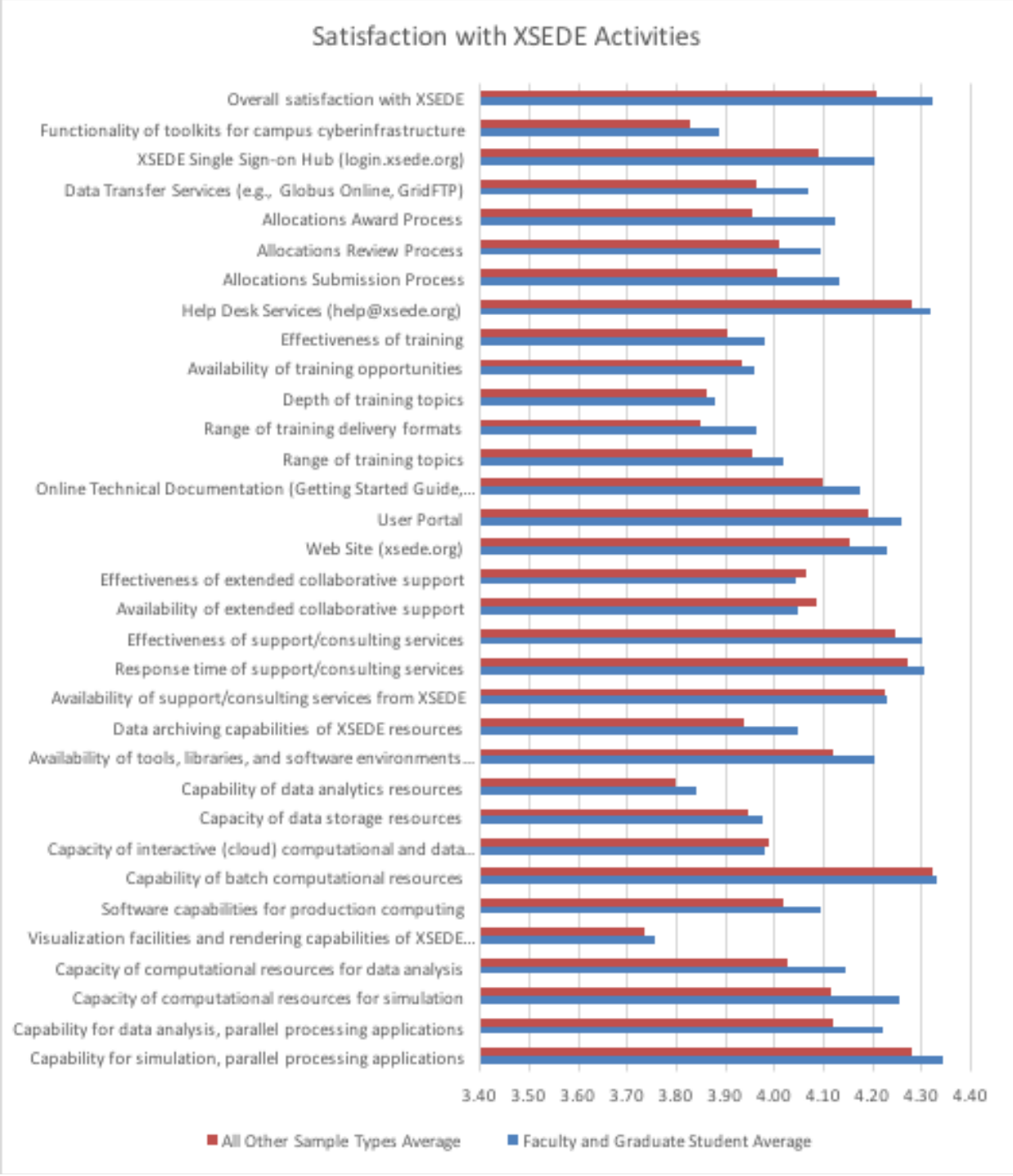
	Mean	Center, Non-Research Staff	Center, Research Staff	Faculty	Govern-mer User	Graduate Student	High School User	Corporate Industrial User	Non-profit User	Other	Post-Doctor Fellow	Undergrad Student	Univ, Non-research Staf	Univ, Research Staff
Capability of computational resources for simulation	**4.32**	4.29	4.32	4.41	4.38	4.28	4.50	3.91	3.88	3.50	4.35	4.00	4.53	4.27
Capability computational resources for data analysis	**4.18**	4.14	4.23	4.26	4.12	4.18	5.00	3.88	4.06	3.00	4.14	3.75	4.25	4.11
Capacity of computational resources for simulation	**4.20**	4.36	4.04	4.29	4.20	4.21	4.50	3.63	3.88	3.00	4.12	4.08	4.21	4.22
Capacity of computational resources for data analysis	**4.10**	4.00	4.00	4.19	3.87	4.10	5.00	3.57	4.12	3.33	4.03	4.20	4.29	4.02
Visualization facilities and rendering capabilities	**3.75**	3.91	3.54	3.72	3.40	3.78	5.00	4.00	4.00	3.33	3.81	3.71	4.14	3.44
Software capabilities for production computing	**4.06**	4.27	4.00	4.14	4.10	4.05	4.50	3.89	3.73	3.25	4.06	4.00	4.19	3.95
Capability of batch computational resources	**4.33**	4.31	4.36	4.38	4.44	4.28	4.67	3.90	3.82	3.33	4.37	4.31	4.53	4.32
Capacity of interactive (cloud) compu-tation & data analysis resources	**3.98**	3.93	3.90	3.91	4.50	4.03	4.50	3.00	4.33	3.40	4.04	4.00	4.06	3.95
Capacity of data storage resources	**3.96**	4.07	4.08	4.00	4.07	3.95	5.00	3.75	4.00	3.75	3.93	4.00	4.00	3.74
Capability of data analytics resources	**3.82**	3.91	3.67	3.77	3.83	3.89	5.00	3.67	3.80	3.33	3.84	3.80	4.13	3.60
Availability of tools, libraries, and software environments	**4.17**	4.39	4.15	4.24	4.33	4.16	4.67	3.64	4.00	3.67	4.16	3.92	4.05	4.03
Data archiving capabilities of resources	**4.00**	4.00	3.92	4.06	4.23	4.03	4.50	3.57	3.77	3.33	3.97	4.10	4.09	3.80
Availability of support/consulting services	**4.23**	4.26	4.20	4.28	4.24	4.18	4.33	4.25	4.07	3.50	4.29	4.10	4.05	4.20
Response time of support/consulting services	**4.29**	4.21	4.09	4.36	4.12	4.25	5.00	4.13	4.27	3.67	4.31	4.38	4.22	4.36
Effectiveness of support/consulting services	**4.28**	4.16	4.00	4.38	4.24	4.22	5.00	3.88	4.13	3.75	4.34	4.13	4.22	4.28
Availability of extended collaborative support	**4.06**	4.31	4.00	4.08	4.22	4.02	5.00	3.80	4.00	3.00	4.04	3.67	4.36	4.18
Effectiveness of extended collaborative support	**4.05**	4.31	3.95	4.08	4.22	4.01	5.00	4.00	4.00	3.00	4.00	3.67	4.44	4.13
Web Site (xsede.org)	**4.20**	4.22	4.17	4.24	4.15	4.21	3.75	4.30	4.00	3.25	4.20	4.36	4.13	4.08
User Portal	**4.23**	4.27	4.11	4.29	4.14	4.22	3.75	4.00	4.05	3.25	4.27	4.50	4.04	4.15
Online Technical Documentation	**4.14**	4.07	4.08	4.23	4.16	4.11	4.33	4.30	3.81	3.50	4.13	3.77	3.96	4.22
Range of training topics	**3.99**	4.00	4.10	4.09	4.21	3.95	4.50	3.71	3.80	3.00	3.88	3.78	4.00	4.04
Range of training delivery formats	**3.91**	4.05	3.93	4.04	4.21	3.89	4.00	3.67	3.71	3.00	3.81	3.40	3.94	3.86
Depth of training topics	**3.87**	4.06	4.00	3.98	4.29	3.79	4.00	3.67	3.86	3.00	3.74	3.75	3.94	3.92
Availability of training opportunities	**3.95**	4.00	4.06	4.09	4.29	3.85	4.00	3.71	3.80	3.00	3.89	3.63	3.84	4.02
Effectiveness of training	**3.95**	4.11	4.10	4.10	4.29	3.87	4.00	3.43	3.79	3.00	3.81	3.86	3.82	3.98
Help Desk Services (help@xsede.org)	**4.30**	4.15	4.14	4.38	4.39	4.26	4.50	4.25	4.28	3.25	4.38	4.33	4.21	4.21
Allocations Submission Process	**4.08**	3.89	3.91	4.18	4.12	4.08	5.00	3.67	3.83	3.33	4.08	3.67	3.89	4.05
Allocations Review Process	**4.06**	3.89	3.91	4.16	4.18	4.02	5.00	3.86	3.88	3.33	4.08	3.57	4.13	3.97
Allocations Award Process	**4.05**	3.84	3.97	4.21	4.06	4.02	5.00	3.88	3.94	3.33	3.96	3.86	4.07	3.92
Data Transfer Services	**4.02**	4.06	3.52	4.06	4.33	4.07	5.00	3.20	3.75	3.33	4.02	3.25	4.24	4.06
XSEDE Single Sign-on Hub (login.xsede.org)	**4.15**	4.21	3.91	4.25	4.28	4.16	4.00	4.09	3.89	3.75	4.10	3.85	4.18	4.16
Functionality of toolkits for campus cyberinfrastructure	**3.86**	3.58	3.69	3.79	4.00	3.93	5.00	4.00	3.86	3.00	3.89	3.67	4.00	3.80
Overall satisfaction with XSEDE	**4.28**	4.28	4.35	4.45	4.21	4.19	3.75	3.82	4.00	3.67	4.30	4.00	4.05	4.17

* Shading shows deviation of cell (institution type) score from mean score for the service or resource (in gray). Shading is computed separately for each row.

-1.00	-0.75	-0.50	-0.25	0.00	0.25	0.50	0.75	1.00
1.00 or more below mean		0.50 below mean		Mean for Service		0.50 above mean		1.00 or more above mean

The average mean ratings of the faculty/graduate students and all other sample types did not differ more than .11 with the exception of the following: Capacity of computational resources for simulation (+.14), Capability of computational resources for data analysis (+.12), Allocations Submission Process (+.13), and Allocations Award Process (+.17). Average satisfaction ratings **of** the combined faculty and graduate student populations compared to all other sample types are in Figure 3 below.

Figure 3. Average satisfaction ratings of combined faculty and graduate student populations compared to all other sample types



In support of quantifiable satisfaction data, survey respondents offered valuable qualitative data in the form of hundreds of largely positive, constructive, and, in many cases, specific text comments to open-ended questions. XSEDE was praised for its level of service in many of the these comments, notably:

- I think the growing number of XSEDE-related webinars is doing a great job. More of these webinars and their documentation will help researchers around the country.
- As a federal scientist, I encourage XSEDE to continue to make resources available to those US researchers who are not supported by NSF grants. Federal scientists are not eligible to compete for NSF grants, and the XSEDE computing resources are a critical mechanism for accessing and using supercomputing facilities.
- I am so very grateful to those who make these resources available, especially important to a "little fish" like myself. Thank you for all you do to make this resource readily available!
- The ability to use free, shared HPC resources for bioinformatics analyses (e.g. transcriptome assembly and annotation) is critical for democratization and progress in data-intensive biology
- XSEDE is the single factor that enabled our metagenome analysis that would otherwise be impossible for us to perform. I heard about it from a graduate student from my lab who had been using it, and I also really appreciated that we had a campus champion to provide support and guidance.
- XSEDE is an outstanding resource. My research remains severely hampered by inadequate speed and size of the computing resources, so I am strongly supportive of XSEDE increasing in capacity and speed -- it is vital for my work and the work of others.
- At every level, XSEDE personnel have been professional, highly competent and pleasant to work with. XSEDE is very well managed; I have no complaints.
- I feel XSEDE and the management are doing a very good job in meeting its mission and keeping itself open to suggestions and changes.
- Help desk are extremely helpful. When I want to install programs or when I have questions on usage of resources, their responses are always fast and helpful.

Respondents also provided comments on areas where improvement may be needed, including:

- Make multi-year allocations. Especially for Science Gateways that feed into large user communities. Also enable quick ways to get a supplement. Currently, it is almost impossible to get extra computation time within an hour or two. This really hurts science gateways that rely on supercomputing infrastructure. Keep in mind users are unpredictable and no one can foresee their crazy ideas. Yet these ideas drive science.
- I think there is definitely a need to coordinate capacity building opportunities with federal government R&D units. I have a good deal of experience with this and would be happy to provide details via a follow-up conversation if it would be helpful.
- Is it possible to provide a mentorship or collaboration for people like me who has a very limited background of bio-informatics/sequence analysis?
- More beginner-oriented help content.
- More demo accounts and easier to integrate local resources - installing custom (but general use) software builds has been a time sink to getting applications moved from local cluster to use on XSEDE.
- It would be great to be able to host a Jupyter Notebook server that has access to XSEDE resources and data. Because we have many TB of data, this is one of the few feasible ways to share it. There might already be a way to do this, but I don't know how.

- It would be great if there was a backfill queue, similar to BlueWaters. There, users can see jobs queued, amount of nodes free, and nodes reserved for the queued jobs; you can use that information to create jobs that can take up the "backfill" (i.e., nodes reserved for other jobs but aren't used yet because they don't have enough nodes reserved).
- Metadata, automated performance reporting and run time predictions would be great. Support for some third-party software (with NSF or private funding supplements) would be very useful.

Section D contains all open-ended text responses.

Software Services and Service Components

Items evaluated in this section of the survey are much more granular and specific, targeted to specific sub-populations, and, therefore, have many fewer responses. Results were mixed, but most *previously* evaluated services and components were down slightly in both importance and in meeting expectations. Reporting higher mean scores for importance and meeting expectations were: Login to XSEDE using multiple factors; Authenticating using campus InCommon credentials; Globus Transfer Service; Globus Sharing Service; and Globus Connect.

Table 12. Software Services and Service Components Importance and Expectations

	To what extent are the following important to your work? (Scale: 1-not at all important, 2-slightly unimportant, 3-Neutral, 4-Very important, 5-Essential)		How often does performance meet your expectations? (Scale: 1-Never, 2-Rarely, 3-Sometimes, 4-Often, 5-Always)	
XSEDE Software and Service Components	N	Mean	N	Mean
SSH Command Line Components				
Login to SP resources thru the single sign-on hub (login.xsede.org) using XSEDE credentials	827	3.48	734	3.91
Direct login to SP resources using SP specific credentials	811	3.44	689	3.84
Direct login to SP resources with XSEDE credential using MyProxy and GSI OpenSSH	815	3.15	651	3.51
Login to XSEDE using multiple factors (only rate this capability if you know you are using it)	627	3.10	531	3.60
XSEDE allocation lookup command line tool (xdusage)	767	3.07	614	3.30
Federated Credentials Components				
Authenticating to the XSEDE User Portal and other web services using campus InCommon credentials	98	3.58	77	3.78
Using XSEDE credentials to log in non-XSEDE Web services (e.g., GENI, OrCID)	93	2.65	65	3.03
Data management services components				
Globus Transfer Service	129	4.03	112	3.97
Globus Sharing Service	126	3.37	102	3.59
Globus Connect for moving data between personal systems and XSEDE resources	127	3.98	110	3.90
scp to copy file to/from XSEDE resources	130	4.18	119	4.21
Searched for software components				
Software search capability available thru the XSEDE User Portal (XUP)	326	3.47	268	3.65
Batch Jobs components				
The job start prediction service (Karnak)	594	2.90	465	3.04
XSEDE cloud resources components				
Jetstream	125	3.95	116	3.78
Bridges	120	3.31	91	3.57
Comet	122	3.50	95	3.76
Science gateways				
Overall (no components)	204	3.69	189	4.05
Campus cluster integration				
Overall (no components)	21	3.90	21	3.95

Training

Respondents were again largely neutral to positive about about the training methods they were asked to rate, but showed a clear preference for the ability to self-serve through the use of just-in-time, online resources.

Table 13. Respondents' preferred training methods

Please rate your training preferences on a scale of 1 to 5, with 1 being "strongly do not prefer" and 5 being "strongly prefer"									
	Mean	Number of Applicable Responses	Distribution (1=Strongly do not prefer, 5=Strongly prefer)					N/A or No response provided	Histogram
			1	2	3	4	5		
Monthly multi-cast workshops/tutorials (with local moderator)	3.59	639	2.0%	6.9%	38.2%	36.0%	16.9%	468	
Live in-person tutorials/workshops	3.48	663	2.7%	11.8%	37.3%	31.8%	16.4%	444	
Live online webinars	3.81	718	1.8%	5.7%	25.9%	43.2%	23.4%	389	
Recordings of live webinars (with minimal editing)	3.93	736	1.1%	4.9%	24.0%	39.4%	30.6%	371	
Self-Paced Online Tutorials	4.19	781	0.4%	1.8%	16.6%	41.1%	40.1%	326	
Web documentation	4.34	841	0.2%	1.1%	12.8%	36.4%	49.5%	266	

When examining training preferences by population type and/or role, preferences map closely to those of the overall population, with Web documentation and self-paced online tutorials being the most preferred methods. Data does not suggest that any particular field of study or professional role overwhelmingly affects one's preferred method of training delivery.

C.4 Respondent Demographics

In the 2018 annual survey, there were 1,107 respondents, although not all answered every question. In compliance with Indiana University Institutional Review Board protocol, the XSEDE User Survey never contains any compulsory questions, and respondents may skip any item without prompt or penalty. While respondents have always been free to skip any question, in 2016, as an additional safeguard to protect the identity of respondents, we began offering an explicit "prefer not to disclose" option. This has resulted in a fairly high percentage of respondents opting not to disclose and, therefore, some of the demographic numbers have changed more than what might be expected over the course of the project, specifically with larger populations (e.g., White and Asian).

- **Gender:**
  Male: 711, 64%
  Female: 183, 17%
  Non-Cisgender: 3, <1%
  Unidentified (Prefer not to disclose/Did not answer): 210, 19%

- **Ethnicity**
  Non-Hispanic: 847, 77%
  Hispanic: 68, 6%
  Unidentified (Prefer not to disclose/Did not answer): 192, 17%

- **Race***
  White: 452, 41%
  Asian: 322, 29%
  Black or African American: 29, 3%
  Other: 25, 2%
  American Indian (Native America): 12, 1%
  Native Hawaiian or Pacific Islander: 3, <1%
  Alaska Native: 1, <1%
  Unidentified (Prefer not to disclose/Did not answer): 270, 24%

- **Size of respondents' academic institutions**
  Large (greater than 10,000 degree-seeking students): 606, 55%
  Medium (3000-10,000 degree-seeking students): 170, 15%
  Small (less than 3000 degree-seeking students): 105, 9%
  Not applicable: 67, 6%
  Did not answer: 159, 14%

- **Characteristics of respondents' academic institutions***
  Doctorate-granting University: 701, 635
  Research focused Institution: 431, 39/%
  Master's College/University: 223, 20%
  Baccalaureate College/University: 196, 18%
  Teaching focused Institution: 161, 15%
  EPSCoR Institution: 73, 7%
  Minority Serving Institution: 68, 6%
  HPC Resource Provider: 69, 6%
  Government Lab or Center: 62, 6%
  Non-Profit Organization (non-academic): 24, 2%
  Corporate/Industrial Organization: 15, 1%
  Associate's College (all degrees are at the associate's level): 14, 1%
  Not applicable/Did not answer: 201, 18%

- **Respondents' roles within their current organizations**
  Graduate student: 368, 33%
  University faculty or equivalent: 298, 27%
  Postdoctoral fellow: 184, 17%
  University/Center research staff or equivalent (non-postdoctoral): 115, 10%
  University/Center non-research support staff (or equivalent): 57, 5%
  Government User: 24, 2%
  Non-profit user: 21, 2%
  Undergraduate student: 17, 2%
  Industrial User: 12, 1%
  Other/Unknown/Unaffiliated: 6, <1%
  High School User: 5, <1%

- **Respondents' primary fields of study**
  Engineering: 181, 16%
  Chemistry: 155, 14%
  Physics: 147, 13%
  Biology: 112, 10%
  Computer and Information Science: 106, 10%
  Mathematics/Statistics: 41, 4%
  Astronomy: 40, 4%
  Earth Science: 33, 3%
  Other: 33, 3%
  Atmospheric Sciences: 31, 3%
  Ocean Sciences: 21, 2%
  Business/Economics: 12, 1%
  Medicine/ Health and Wellness, 9, <1%
  Art and Humanities: 6, <1%
  Diseases: 4, <1%
  Social Sciences: 3, <1%
  Not applicable/Did not answer: 173, 17%

* *Respondents could select "all that apply"; percentages do not equal 100.*

D. Appendices

D.1 Final Questionnaire

XSEDE (Extreme Science and Engineering Discovery Environment)

Annual Satisfaction Survey
Final Questionnaire

INFORMED CONSENT:
You are invited to participate in the XSEDE User Satisfaction Survey. We ask that you read this statement and ask any questions you may have before agreeing to take the survey. The National Science Foundation funds this survey.

STUDY PURPOSE:
The purpose of the XSEDE User Satisfaction Survey is aimed at assessing current levels of satisfaction with the XSEDE cyberinfrastructure environment and its associated resources and services (e.g., training, allocations, support, etc.). Survey information will be used to improve and expand the services provided by XSEDE and to aid in the decision-making process related to future resource allocations.

PROCEDURES FOR THE STUDY:
If you agree to be in the study, you will complete an online survey in which you will not be required to provide any identifying information. You will have the option of providing your name and contact information if future contact is desired. Future contact may be conducted via email, telephone, videoconference, in-person interviews and/or focus group. You will be asked to disclose your gender, race, ethnicity, and other demographic information for tracking purposes only. The survey will remain confidential, and survey responses will not be associated with any identifying information, even if you choose to disclose your name and contact information for potential future contact.

You will receive via email an initial letter of invitation, followed by up to six reminder messages. After the initial letter of invitation, only those who have not responded will receive subsequent messages. You will have the opportunity to opt out of all future communications upon receipt of the initial letter of invitation. The XSEDE User Satisfaction Survey should not take more than 15 minutes to complete, with an average time for completion in the eight- to ten-minute range.

CONFIDENTIALITY:
Efforts will be made to keep any personal information that you might inadvertently disclose confidential. We cannot guarantee absolute confidentiality. Your personal information may be disclosed if required by law. Your identity will be held in confidence in reports in which the survey results may be published and/or databases in which results may be stored.

Organizations that may inspect and/or copy survey records for quality assurance and data analysis include groups such as the study investigator and his/her research associates, the Indiana University Institutional Review Board or its designees, the study sponsor, the National Science Foundation, and (as allowed by law) state or federal agencies, specifically the Office for Human Research Protections (OHRP).

CONTACTS FOR QUESTIONS OR PROBLEMS:
For questions about the study, contact Julie Wernert at (812) 856-5517 or jwernert@iu.edu.
To inquire about your rights as a participant, discuss problems, complaints or concerns about a research study, or to obtain information, or offer input, contact the IU Human Subjects Office at (812) 856-4242 or by email at irb@iu.edu.

VOLUNTARY NATURE OF STUDY:
Taking part in this study is voluntary. You may choose not to take part or may leave the survey at any time. Leaving the survey will not result in any penalty. Your decision whether or not to participate in this survey

will not affect your current or future relations with Indiana University, the XSEDE program, or the National Science Foundation.

This study was approved by the Indiana University Institutional Review Board on February 7, 2018. Please reference Study # 1301010398A012/exempt when inquiring.

1. **Please rate your awareness of the following resources and services associated with, or operated by, the XSEDE cyberinfrastructure environment on a scale of 1 to 5, with 1 being "Not at all aware" and 5 being "Extremely aware":**

   1-Not at all aware/Never heard of it
   2-Slightly aware
   3-Somewhat aware
   4-Moderately aware
   5-Extremely aware

   Mission
   Computational Resources
   Data Storage Services
   Visualization Services
   Cloud Resources
   Science Gateways
   Campus Champions Program
   Web Site (xsede.org)
   User Portal
   Online Technical Documentation (Getting Started Guide, User Guides, etc.)
   Training Opportunities
   Community Engagement and Enrichment Opportunities (previously Education and Outreach Opportunities)
   Help Desk Services (help@xsede.org)
   Extended Collaborative Support Services (ECSS)
   Data Storage Transfer Services (e.g., Globus Online, GridFTP)
   Software Integration Support
   Resources Integration Support (including campus resources and campus cluster installation)
   Software Usage Instrumentation Support
   Software capabilities provided by XSEDE
   XSEDE Single Sign-on Hub (login.xsede.org)

2. **In the past year, approximately how often did you use the following resources and services associated with, or operated by, the XSEDE cyberinfrastructure environment?**

   Do not use/Not applicable
   Once/Twice per year
   Monthly
   Weekly
   Daily

   Computational Resources
   Visualization Systems
   Cloud Resources
   Data Resources
   Training Resources
   User Portal
   Website

3. **How long have you used XSEDE-associated and/or -operated resources and services (or those of its predecessor program, TeraGrid) and/or overseen the use of these resources by others? (In this case, "resources" is broadly defined to include, but not limited to, training, workshops, online help sources, and consulting, as well as computational, cloud, storage, and visualization resources.)**

   Never/not yet used
   Less than 6 months
   6-11 months
   1-2 years
   3-5 years
   More than 5 years

4. **Please describe your level of experience using XSEDE-associated or -operated resources on a scale of 1 to 5, with 1 being "Not at all experienced" and 5 being "Very experienced." (In this case, "resources" is broadly defined to include, but not limited to, training, workshops, online help sources, and consulting, as well as computational, cloud, storage, and visualization resources.)**

   1-Not at all experienced
   2-Somewhat inexperienced
   3-Somewhat experienced
   4-Moderately experienced
   5-Very experienced

5. **Please tell us about any products (as defined by the National Science Foundation) you have produced that have benefited in some way from use of XSEDE-associated and/or –operated resources. Please select all that apply.**

   Not applicable
   Journal articles
   Books
   Book Chapters
   Thesis/Dissertations
   Conference Papers and Presentations
   Other Publications
   Technologies or Techniques
   Patents
   Inventions
   Licenses
   Websites
   Other:

6. **Please rate the importance of resources and services associated with, or operated by, XSEDE in conducting your work on a scale of 1 to 5, with 1 being "Not important at all" and 5 being "Essential." If you are unable to assess the importance of these resources in conducting your work, please select "Don't know/Not applicable."**

   X-Don't know/Not applicable
   1-Not important at all
   2-Somewhat unimportant
   3-Neutral
   4-Somewhat important
   5-Essential

7. **Are you aware of individuals at your institution available to assist with your use of XSEDE-associated and/or –operated resources and services? Please select all that apply.**

   No, I do not know of a resource person at my institution
   XSEDE-funded staff member
   Campus Champion
   Local IT support person (i.e., an individual not designated as a Campus Champion)
   Colleague (faculty, post-doc, graduate student, etc.) at my institution

8. **Please rate your satisfaction with the following XSEDE-associated and/or -operated activities, services, and capabilities on a scale of 1 to 5, with 1 being "Very dissatisfied" and 5 being "Very satisfied." If you have no basis for rating your satisfaction, please select "Not applicable/Do not use."**

   X-Not applicable/Do not use
   5-Very dissatisfied
   4-Dissatisfied
   3-Neither satisfied nor dissatisfied
   2-Satisfied
   1-Very satisfied

   Thinking in terms of types of resources:

   Capability (scalability) of XSEDE computational resources for simulation, particularly parallel processing applications
   Capability (scalability) of XSEDE computational resources for data analysis, particularly parallel processing applications
   Capacity (in terms of high throughput computing) of computational resources for simulation
   Capacity (in terms of high throughput computing) of computational resources for data analysis
   Visualization facilities and rendering capabilities
   Software capabilities for production computing

   Thinking in terms of mode of access of resources:

   Capability of batch computational resources (e.g. Stampede, Comet, Bridges)
   Capacity of interactive (cloud) computational and data analysis resources (e.g., Jetstream, Comet, Bridges)
   Capacity of data storage resources (e.g., Wrangler data storage)
   Capability of data analytics resources (e.g., Wrangler data analytics cluster)

9. **Please rate your satisfaction with the following XSEDE-associated and/or -operated activities, services, and resources on a scale of 1 to 5, with 1 being "Very dissatisfied" and 5 being "Very satisfied." If you have no basis for rating your satisfaction, please select "Not applicable/Do not use."**

   X-Not applicable/Do not use
   1-Very dissatisfied
   2-Dissatisfied
   3-Neither satisfied nor dissatisfied
   4-Satisfied
   5-Very satisfied

Availability of tools, libraries, and software environments needed for your work
Data archiving capabilities of resources
Availability of support/consulting services
Response time of support/consulting services
Effectiveness of support/consulting services
Availability of extended collaborative support
Effectiveness of extended collaborative support
Web Site (xsede.org)
User Portal
Online Technical Documentation (Getting Started Guide, User Guides, etc.)
Range of training topics
Range of training delivery formats
Depth of training topics
Availability of training opportunities
Effectiveness of training
Help Desk Services (help@xsede.org)
Allocations Submission Process
Allocations Review Process
Allocations Award Process
Data Transfer Services (e.g., Globus Online, GridFTP)
XSEDE Single Sign-on Hub (login.xsede.org)
Functionality of toolkits for campus cyberinfrastructure (e.g., XSEDE Compatible Basic Cluster [XCBC], XSEDE National Integration Toolkit [XNIT])

10. Please rate your overall satisfaction with the XSEDE cyberinfrastructure environment on a scale of 1 to 5, with 1 being "very dissatisfied" and 5 being "very satisfied." If you have no basis for rating your satisfaction, please select "Not applicable."

X-Not applicable/Do not use
1-Very dissatisfied
2-Dissatisfied
3-Neither satisfied nor dissatisfied
4-Satisfied
5-Very satisfied

11. Considering your use of XSEDE-associated and/or –operated resources and services, in which of the following activities have you engaged? Please select all that apply.

Accessed resources via science gateways
Logged in using an SSH command line
Accessed resources via campus federated credentials
Utilized data management services
Searched for software available on available resources
Ran batch jobs
Used cloud resources
Campus cluster integration
None of the above

To what extent are the following components, capabilities, and/or resources important to your work? 1 Not at all important, 2 Slightly important, 3 Neutral, 4 Very important, 5 Essential; How often does their performance meet your expectations? 1 Never, 2 Rarely, 3 Sometimes, 4 Often, 5 Always

Science Gateways
SSH Command Line Components:
- Login to SP resources thru the single sign-on hub (login.xsede.org) using XSEDE credentials
- Direct login to SP resources using SP specific credentials
- Direct login to SP resources with XSEDE credential using MyProxy and GSI OpenSSH
- Login to XSEDE using multiple factors (only rate this capability if you know you are using it)
- XSEDE allocation lookup command line tool (xdusage)

Federated Credentials Components:
- Authenticating to the XSEDE User Portal and other web services using campus InCommon credentials (CILogon)
- Using XSEDE credentials to log into non-XSEDE Web services (e.g., GENI and OrCID.)

Data management services components:
- Globus Transfer Service
- Globus Sharing Service
- Globus Connect for moving data between personal systems and XSEDE resources
- scp to copy file to/from XSEDE resources

Searched for software components:
- Rate the software search capability available thru the XSEDE User Portal (XUP)

Batch jobs components:
- The job start prediction service (Karnak)

XSEDE cloud resources components:
- Jetstream
- Bridges
- Comet

Campus Cluster Integration

12. **If you rated any of the items in the previous question at a "3" or lower, please share with us your specific concerns and/or causes for your dissatisfaction.**

13. **Would you benefit from XSEDE-provided metadata management software or services that would enable your collaborators and the broader community to discover your data?**

No, my research does not need to share metadata.
No, we already have a solution for sharing data.
Yes, my research could benefit from this software/service.
Yes, this would be very helpful to my research.
I am not sure at this time.

14. **Would you be willing to talk to us about your requirements or be early testers/adopters of candidate metadata management software or services?**

Yes
No

15. **Please rate your preference for the following training delivery methods on a scale of 1-5, with 1 being "Strongly do not prefer" and 5 being "Strongly prefer." If you have no basis for rating your preference, please select "Not applicable."**

    X-Not applicable
    1-Strongly do not prefer
    2-Do not prefer
    3-Neutral
    4-Prefer
    5-Strongly prefer

    Monthly Multi-Cast Workshops/Tutorials (with Local Moderator)
    Live, In-Person Tutorials/Workshops
    Live, Online Webinars
    Recordings of live webinars (with minimal editing)
    Self-Paced, Online Tutorials
    Web Documentation

16. **Please share any comments you may have about the training opportunities offered by XSEDE (e.g., training topics important to you, training topics missing from the current offerings, preferred training delivery formats, depth of training offerings, etc.)**

17. **How would your work be affected if XSEDE did not exist? Please select all that apply.**

    Don't know/Not applicable
    The time required to finish my research projects would substantially increase.
    The size and/or scope of my research projects would be substantially reduced .
    The quality of my research results would likely suffer.
    I would complete my research projects with other similar high-performance resources.
    I would complete my research project with conventional resources.
    My ability to collaborate with other researchers would be limited.
    My employment prospects would be limited.
    I would abandon some or all of my projects.
    Other: _____

18. **Do you have other comments to offer about how your work would be affected if the XSEDE environment did not exist?**

19. **What unique value did the XSEDE cyberinfrastructure environment provide to you beyond enabling access to a computing resource?**

20. **How could XSEDE cyberinfrastructure environment be more useful to your research or educational program? (For example, are there new resources or services that would be useful? Are there new features or improvements to existing services that would be useful?)**

21. **Do you have any other suggestions or comments regarding the XSEDE cyberinfrastructure environment or the value derived from the National Science Foundation's investment in the XSEDE program?**

22. Please select your primary role – the one that best describes your work relative to XSEDE cyberinfrastructure environment.

Executive leadership (e.g., director, CIO, etc.)
University faculty or equivalent
University/Center research staff or equivalent (non-postdoctoral)
University/Center non-research support staff (or equivalent)
Postdoctoral fellow
Graduate student
Undergraduate student
XSEDE staff member
NSF staff member
Other, please specify: _____

23. Are you a Campus Champion?

Yes
No

24. What is your primary research field or field of study?

Arts and Humanities
Astronomy
Atmospheric Sciences
Biology
Business (Finance/Accounting, Marketing, etc.)
Chemistry
Diseases
Computer and Information Science
Earth Sciences (includes Geology)
Economics
Engineering
Health and Wellness
Higher Education (Administration)
Mathematics
Medicine
Ocean Sciences
Physics
Political Science
Psychology
Sociology
Other, please specify: _____
Not applicable

25. Please describe the size of your academic institution:

Small (less than 3,000 degree seeking students)
Medium (3,000 – 10,000 degree seeking students)
Large (greater than 10,000 degree seeking students)
Not applicable

26. Please describe your institution/organization: Please select all that apply.

Institution located in an EPSCoR state
Minority-Serving Institution (MSI)
Associate's College (all degrees are at the associate's level)
Baccalaureate College/University
Master's College/University
Doctorate-Granting University
Teaching-Focused Institution
Research-Focused Institution
Government Lab or Center
High performance computing resource provider (e.g. NCSA, TACC, etc.)
Non-Profit Organization (non-academic)
Corporate/Industrial Organization

27. What is your gender?

Male
Female
Non-Cisgender
Prefer not to disclose

28. What is your ethnicity?

Hispanic or Latino
Not Hispanic or Latino

29. What is your race? Please select all that apply.

American Indian
Alaska Native
Asian
Black or African-American
Native Hawaiian or Other Pacific Islander
White
Other:_____
Prefer not to disclose

30. Are you willing to be contacted for a follow-up interview (or focus group participation) to provide the XSEDE program with additional feedback on your user experience? (PROGRAMMING SKIP: IF 'NO' END SURVEY)

Yes
No

31. Please indicate the areas on which you might like to provide feedback. Select all that apply.

Computational resources
Visualization resources
User support
Online, support resources
Broadening Participation
Campus Champions
Training Resources
Educational Resources
Software Resources and Services
File Transfer, Data Movement
Allocations
General feedback on the XSEDE program
Other: _____

32. Please provide the following information for a follow-up interview to discuss your feedback with an XSEDE staff member. All survey questions are optional and your answers are confidential. If you choose to provide your name and contact information, it will be used solely for the purpose of contacting you for additional feedback and will not be associated with your survey responses.

Name:
Institution:
Phone number:
Preferred email address:

33. May we share your responses and comments with the XSEDE staff member(s) conducting follow-up interviews and/or focus groups?

Yes
No

D.2 Email Invitation and Reminder Messages

SURVEY INVITATION

From Name: John Towns
From Email: Center for Survey Research
Subject Line: 2018 XSEDE Annual Satisfaction Survey

Dear {firstname} {lastname}:

XSEDE (eXtreme Science and Engineering Discovery Environment) is the most advanced, powerful, and robust collection of integrated, advanced, digital resources and services in the world — a single virtual system used by researchers, technologists, and scientists, such as yourself, to interactively share computing resources, data, and expertise.

Your feedback is vital to the evolution of this important resource, and I am writing to ask for your participation in the 2018 XSEDE Satisfaction Survey conducted on behalf of XSEDE by Indiana University. The survey will take less than 15 minutes to complete.

The annual survey aims to assess users' current levels of satisfaction with the XSEDE computational environment and its associated services and activities (e.g., training, allocations, user support, etc.). Your feedback is used to improve and expand services to the XSEDE community and to aid the project's leadership team in its decision-making processes.

The survey can be accessed here:
https://survey.indiana.edu/xsede18/{loginID}/{contact}

The Indiana University Center for Survey Research administers the survey and assures that your responses are confidential. Neither your name or your institution will be identified in any reports or presentations, and all survey responses will be presented in the aggregate. Please be assured that should you voluntarily provide your name and contact information for further follow up, your contact information will not be associated with your survey responses unless you indicate otherwise.

If you have any questions about this survey or how the results will be used, please feel free to contact Julie Wernert, Information Manager, Indiana University, at jwernert@iu.edu, or (812) 856-5517.

Sincerely,

- John

John Towns
PI and Project Director, XSEDE
Executive Director, Science & Technology, NCSA
Deputy CIO for Research IT, Office of the CIO
University of Illinois
Email: jtowns[AT]ncsa.illinois.edu
Phone: +1-217-244-3228

REMINDER 1

From Name: John Towns
From email: Center for Survey Research
Subject Line: REMINDER: 2018 XSEDE Annual Satisfaction Survey

Dear {firstname} {lastname}:

Last week, I wrote asking for your feedback on the XSEDE computational environment and its associated services and activities. Your feedback is vital to the evolution of this important resource, and I am writing again in the hope that you will take just 15 minutes yet today to complete the survey.

The survey can be accessed here:
https://survey.indiana.edu/xsede18/{loginID}/{contact}

The Indiana University Center for Survey Research administers the survey and assures that your responses are confidential. Neither your name or your institution will be identified in any reports or presentations, and all survey responses will be presented in the aggregate. Please be assured that should you voluntarily provide your name and contact information for further follow up, your contact information will not be associated with your survey responses unless you indicate otherwise.

If you have any questions about this survey or how the results will be used, please feel free to contact Julie Wernert, Information Manager, Indiana University, at jwernert@iu.edu, or (812) 856-5517.
Thank you for your support and consideration.

Sincerely,

-John

John Towns
PI and Project Director, XSEDE
Executive Director, Science & Technology, NCSA
Deputy CIO for Research IT, Office of the CIO
University of Illinois
Email: jtowns[AT]ncsa.illinois.edu
Phone: +1-217-244-3228

REMINDER 2

From Name: John Towns
From email: Center for Survey Research
Subject Line: REMINDER: 2018 XSEDE Annual Satisfaction Survey

Dear {firstname} {lastname}:

Earlier this month, I wrote asking for your feedback on the XSEDE computational environment and its associated services and activities. Your feedback helps us to improve and expand services to the XSEDE user community and guides us in our decision-making processes.

I am writing again to ask that you take a few minutes out of what I know is already a very busy day to give us your feedback. Your time is greatly valued, and your insights are of great interest to XSEDE leadership. The survey will take less than 15 minutes to complete.

The survey can be accessed here:
https://survey.indiana.edu/xsede18/{loginID}/{contact}

The Indiana University Center for Survey Research administers the survey and assures that your responses are confidential. Neither your name or your institution will be identified in any reports or presentations, and all survey responses will be presented in the aggregate. Please be assured that should you voluntarily provide your name and contact information for further follow up, your contact information will not be associated with your survey responses unless you indicate otherwise.

If you have any questions about this survey or how the results will be used, please feel free to contact Julie Wernert, Information Manager, Indiana University, at jwernert@iu.edu, or (812) 856-5517.

Again, thank you for your support and consideration.

Sincerely,

-John

John Towns
PI and Project Director, XSEDE
Executive Director, Science & Technology, NCSA
Deputy CIO for Research IT, Office of the CIO
University of Illinois
Email: jtowns[AT]ncsa.illinois.edu
Phone: +1-217-244-3228

REMINDER 3

From Name: John Towns
From email: Center for Survey Research
Subject Line: XSEDE Needs Your Feedback

Dear {firstname} {lastname}:

As the 2018 XSEDE Annual Satisfaction Survey is set to conclude in a couple of weeks, I want to ask again for your participation. If at all possible, please take just a few minutes to provide your feedback. Your insights are of great interest and value to XSEDE leadership.

The survey can be accessed here:
https://survey.indiana.edu/xsede18/{loginID}/{contact}

The Indiana University Center for Survey Research administers the survey and assures that your responses are confidential. Neither your name or your institution will be identified in any reports or presentations, and all survey responses will be presented in the aggregate. Please be assured that should you voluntarily provide your name and contact information for further follow up, your contact information will not be associated with your survey responses unless you indicate otherwise.

If you have any questions about this survey or how the results will be used, please feel free to contact Julie Wernert, Information Manager, Indiana University, at jwernert@iu.edu, or (812) 856-5517.

Your time and insights are very much appreciated.

Sincerely,

-John

John Towns
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Deputy CIO for Research IT, Office of the CIO
University of Illinois
Email: jtowns[AT]ncsa.illinois.edu
Phone: +1-217-244-3228

REMINDER 4

From Name: John Towns
From email: Center for Survey Research
Subject Line: XSEDE Survey Closing Soon!

Dear {firstname} {lastname}:

I am writing again to ask for your participation in the 2018 XSEDE Satisfaction Survey. I cannot emphasize enough how important your voice is in helping us to improve and expand services to the XSEDE user community.

Please take this opportunity to contribute to the future evolution of this important scientific resource and complete your survey today. I assure you that the survey is brief and will take less than 15 minutes of your time to complete.

The survey can be accessed here:
https://survey.indiana.edu/xsede18/{loginID}/{contact}

The Indiana University Center for Survey Research administers the survey and assures that your responses are confidential. Neither your name or your institution will be identified in any reports or presentations, and all survey responses will be presented in the aggregate. Please be assured that should you voluntarily provide your name and contact information for further follow up, your contact information will not be associated with your survey responses unless you indicate otherwise.

If you have any questions about this survey or how the results will be used, please feel free to contact Julie Wernert, Information Manager, Indiana University, at jwernert@iu.edu, or (812) 856-5517.

Your time and insights are very much appreciated.

Sincerely,

-John

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University of Illinois
Email: jtowns[AT]ncsa.illinois.edu
Phone: +1-217-244-3228

REMINDER 5

From Name: John Towns
From email: Center for Survey Research
Subject Line: FINAL REMINDER: 2018 XSEDE Annual Satisfaction Survey

Dear {firstname} {lastname}:
Before our survey concludes on March 21, I want to again ask for your participation. I cannot emphasize enough how important your voice is in helping us to improve and expand services to the XSEDE user community.

Please take this opportunity to contribute to the future evolution of this important scientific resource and complete your survey today. I assure you that the survey is brief and will take less than 15 minutes of your time to complete.

The survey can be accessed here:
https://survey.indiana.edu/xsede18/{loginID}/{contact}

The Indiana University Center for Survey Research administers the survey and assures that your responses are confidential. Neither your name or your institution will be identified in any reports or presentations, and all survey responses will be presented in the aggregate. Please be assured that should you voluntarily provide your name and contact information for further follow up, your contact information will not be associated with your survey responses unless you indicate otherwise.
If you have any questions about this survey or how the results will be used, please feel free to contact Julie Wernert, Information Manager, Indiana University, at jwernert@iu.edu, or 812-856-5517.
Your time and insights are very much appreciated.

Sincerely,

-John

John Towns
PI and Project Director, XSEDE
Executive Director, Science & Technology, NCSA
Deputy CIO for Research IT, Office of the CIO
University of Illinois
Email: jtowns[AT]ncsa.illinois.edu
Phone: +1-217-244-3228

REMINDER 6

From Name: John Towns
From email: Center for Survey Research
Subject Line: CLOSING TODAY: Final Chance - 2018 XSEDE Annual Satisfaction Survey

Dear [XSEDE colleague],

Now more than ever, your feedback about the XSEDE cyberinfrastructure environment and its associated services and resources is essential. **Even if you feel that you have limited feedback to share**, I encourage you to answer what you think is appropriate and provide comments as to how XSEDE could add more value or be more useful to your research or education program.

I am asking that **you take 15 minutes today** to share your thoughts about this critical resource for the US science and engineering communities.

The survey can be accessed here:
https://survey.indiana.edu/xsede18/{loginID}/{contact}

Thanks, in advance, for your time, consideration, and support.

Best regards,

--John

PI and Project Director, XSEDE
Executive Director, Science & Technology, NCSA
Deputy CIO for Research IT, Office of the CIO
University of Illinois
Email: jtowns[AT]ncsa.illinois.edu
Phone: +1-217-244-3228

REMINDER 7 (FINAL)

From Name: John Towns
From email: Center for Survey Research
Subject Line: CLOSING TODAY: Final Chance – 2018 XSEDE Annual Satisfaction Survey

Dear {firstname} {lastname}:
Today is the final day to complete the XSEDE Annual Satisfaction Survey and I wanted to ask one last time for your participation.

Please take this opportunity to contribute to the future evolution of this important scientific resource and complete your survey by the end of the day. I assure you that the survey is brief and will take less than 15 minutes of your time to complete.

The survey can be accessed here:
https://survey.indiana.edu/xsede18/{loginID}/{contact}

The Indiana University Center for Survey Research administers the survey and assures that your responses are confidential. Neither your name or your institution will be identified in any reports or presentations, and all survey responses will be presented in the aggregate. Please be assured that should you voluntarily provide your name and contact information for further follow up, your contact information will not be associated with your survey responses unless you indicate otherwise.

If you have any questions about this survey or how the results will be used, please feel free to contact Julie Wernert, Information Manager, Indiana University, at jwernert@iu.edu, or 812-856-5517.

Your time and insights are very much appreciated.

Sincerely,

- John

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D.3 Open-Ended Survey Responses – Categorized by Theme

Comments to Question: What unique value did the XSEDE environment provide to you beyond enabling access to a computing resource?

Theme 1: Training/Education (including students)

- Able to educate students on applying computational chemistry to research in their individual fields of study.
- Allows my students access to the parallel computing class at Cal-Berkeley / Ohio
- better training opportunities, easier collaborating with others
- Big Data Training
- Capacity building through training and hopefully support services as I progress on my journey....
- Exposed my undergraduates to a system very different than any they had encountered previously.
- Extensive training programs to introduce me to the HPC community, developing skills often not taught at academic institutions.
- Good learning tool.
- Great value of training and ECSS
- helped in training
- I benefited most from their training on high performance computing methods, such as open MP and open ACC.
- I learned a lot about the capabilities of a supercomputing resource and how to leverage them.
- I learned so much about HPC
- I used XSEDE to teach a graduate level course in parallel computation. The unique value to the students was the ability to write programs and run programs on a world class super computer facility.
- I wouldn't say it's unique, but discovery of new (to me) methods of analysis/simulation.
- Integration of training and hardware/software.
- It allows me to ensure the students in my course have access to first rate computing infrastructure.
- It forced me to learn programs and operating system environments that I probably would have tried to avoid if I had to. Interestingly enough, I would have had to learn them through other classes, so getting the early introduction has helped.
- It has greatly enhanced my knowledge and collaboration with others in my field.
- It is enabling me to share this facility with students in Nablus, Palestine. That is priceless.
- Knowledge and sharing of experience through training sessions
- Learning how to use multiple different environments and how to compile my programs in the different environments
- My research group is learning faster with XSEDE.
- On-line courses and recorded teaching material are very useful to leverage my skills and knowledge
- Taught me how to work with clusters and job systems.

- The price is very reasonable.
- Training opportunities are much more available on Xsede.
- Training/learning resources
- Training
- Training and using HPC resources for myself and my students
- Training on how to best use the software there.
- Training resources
- Training.
- Trainings are helpful.
- User-friendly environment and helpful training tools
- We participated in the online Parallel Applications course last Spring. It was a valuable experience for our students.
- I have attended a weeklong course at TACC. It was very informative and enjoyable.
- XSEDE training
- Ability to launch a GATEWAY for the open source software project that I run. This is now having a large impact in education of students who are doing hands on HPC projects. In addition, through ECSS we have launched new collaborations into parallel optimization methods.
- Access to cutting edge technology is crucial towards the advancement of science, and to educate the young minds that will approach the problems that will shape our future.
- Education and access to not just computing resources but "latest" computing resources
- Hopefully, it will provide a platform to have Jupyter notebooks running Haskell (this is important) open to students in my university classes and also in summer schools at various institutions.
- I am a new assistant professor working in computational physics. HPC systems are essential for my research. As we do not have access to computer clusters in our university (with the exception two small clusters that are inadequate my calculations), XSEDE has been essential to my research. This year, it has been used by my summer REU and my graduate student. It will be even more important starting next academic year when I will hire 2 postdoctoral researchers and another graduate student.
- It provides an opportunity for interacting with other experts in computational science and engineering fields through ECSS support. It also provides an opportunity for education to learn the latest development in computational and data sciences through workshop.
- IU Use Jetstream in training and it's an eye-opening experience for participants to learn about XSEDE and how easy it is to use Jetstream to access resources that they assumed had insurmountable learning curves.
- The most valuable asset of XSEDE is its vast expertise in all areas of scientific computing. Also, its broader impact in training and education.
- The webinars and outreach activities inform me how others use the XSEDE resources and inspire potential alternative approaches in my own work.
- The webinars are something I've used on occasion.
- The workshops were quite helpful
- There is a considerable amount of knowledge available through the website and the training which has proven invaluable in the execution of my job.

Theme 2: Community, Collaboration, Support

- Ability to collaborate and share my research easily.
- Ability to collaborate with scientists on interesting research
- Ability to launch a GATEWAY for the open source software project that I run. This is now having a large impact in education of students who are doing hands on HPC projects. In addition, through ECSS we have launched new collaborations into parallel optimization methods.
- Access to computational specialists and experts who can support us in effective code development. My projects are system science projects (all funded by NSF-ARCSS) and no one can be an expert on everything so access to people skills that can improve our tool boosts our research and expands what questions we can address.
- Access to computer experts and people willing to help out with simulation and computer needs.
- Access to SP staff and their expertise was very important in our adoption and configuration tasks.
- This may be redundant with the question but lowering the barriers with a streamlined startup allocation process made the initial entry into this community easy.
- Collaboration with XSEDE/ECSS staff to consider better methods of solving research problems.
- Community
- Ease of access and support in getting the performance we needed.
- ECSS
- ECSS
- expert help. easy to use pipeline for neuroscience simulations (NSG). free compute cycles.
- Exposure to a diverse environment to test, port, and develop software
- Exposure to the wider HPC community and communicating with peers in other fields working on different projects
- Getting valuable advice from tech support.
- Great community, shared best practices.
- Help desk
- Help desk are extremely helpful. When I want to install programs or when I have questions on usage of resources, their responses are always fast and helpful.
- Help support, experimental platform
- Helpful staff.
- I benefitted immensely from the shared environment with staff without whom it would have been isolation.
- I was part of XSEDE Scholars and it allowed me to be a part of a community.
- It provides an opportunity for interacting with other experts in computational science and engineering fields through ECSS support. It also provides an opportunity for education to learn the latest development in computational and data sciences through workshop.
- Knowledge of other projects & types of work done in other disciplines.
- New approaches to collaborative computing.
- One of my favorite things was the ease of use of Bridges and XSEDE. Even though I am a CS student, sometimes supercomputing centers can be intimidating, but the very detailed online documentation and help service made it very easy.
- Provided helpful feedback on tuning / benchmarking of project resource requirements / usage.

- Strengthened a collaboration. Introduced me to more cutting edge computational approaches in my field.
- Support in figuring out how to use the infrastructure
- support service; community shared modeling systems and software
- Technical support from the help desk service
- The combination of (high quality) educational support and resources is very important.
- The DDT is great too.
- The community of practice
- The ease of use and the support is first-class.
- The help desk was essential to my work, because they helped in fixing, updating, and improving the functionality of specific software. I am very thankful for these services.
- The prompt replies of Help Desk have helped solving problems efficiently.
- The support staff has been phenomenal in making our non-traditional workload work in the XSEDE environment. They have given us insight into some of the infrastructure to help tune our processes, which is very unlikely to happen in any commercial environment.
- The unique aspect that made me get ahead, learn and thrive with XSEDE resources were key people associated with XSEDE, in particular staff at TACC, with particular mention of people like Chris Hempel, Bob Garza, Scott Lathrop, Lind Akli and others.
- The XSEDE ecosystem provides collaboration and opportunities to serve communities of researchers.
- The XSEDE provides the technical help for us to work on XSEDE supercomputer, and software told for us to do the analyses.
- The XSEDE support team and help desk has always been very prompt and helpful addressing any questions. This has helped resolve any issues I have encountered.
- Very prompt and responsive user support. The queues are well-managed such that my jobs start promptly. I have heard that they will issue refunds for service units if the resource was malfunctioning, though I have not had this come up in my own work. Even so, that hasn't always been my experience on other resources.
- When problems arise, XSEDE fixes them rapidly. Not having to worry about management of computational resources saves a large amount of time.
- Work with experts through ECSS.
- XSEDE environment could encourage multi-disciplinary collaboration, as the capability to manage and analyze excessively large data sets provides a platform for people from different domains to work together.
- XSEDE Help Desk is outstanding. All the people try their best to solve any problem we have in no time.
- A coherent set of software and support services across different service providers.
- Availability of preinstalled software
- Availability of some commercial software
- Technical help
- Capacity building through training and hopefully support services as I progress on my journey....
- Capacity to run a large number of simulations and ability to request support without funding
- Easy access and high-quality + very fast helpdesk
- Enriched infrastructure
- Extensive cooperation
- Super computing power

- Exceptional resources and support were extremely valuable in learning a large scale high performance computing infrastructure.
- Extensive training programs to introduce me to the HPC community, developing skills often not taught at academic institutions.
- Great value of training and ECSS
- Having access to XSEDE resources and people makes working at a school without these resources and experts on campus tractable.
- HPC resources for both teaching and research that I do not have to build and maintain.
- Access to very effective, timely help getting things configured and running.
- Provided opportunities to apply for other computing resources like Anton
- Made me more involved into the scientific society.
- It has greatly enhanced my knowledge and collaboration with others in my field.
- It has provided a great collaborative environment for multi-institutional and multi-disciplinary projects that would have been nearly impossible otherwise if we only had access to individual university resources.
- It provides access to new architectures (like on Stampede2) that I wouldn't have access to otherwise. The allows me to see how my code performs differently/better on those architectures. Also, as a developer of an open-source community code, I know that if I can get the software installed on an XSEDE cluster, anyone with an XSEDE account could do the same, reducing the need for me to help users install the code on their own clusters. I'm also excited about setting up a Gateway, although I haven't looked into that in much detail yet.
- It was mostly the computing resources, and the human help getting started.
- Knowledge and sharing of experience through training sessions
- See what other computing resources exist, discuss computing with other scientists.
- The calculations are much faster. The XSEDE staff is helpful.
- The computational side of my group's work (complementing experiment) would not have developed in the first place if we did not have this access. We collaborate with an experimental group, and while our experimental partnership is nice, computation is the key value we bring to the collaboration.
- The extended support was critical for researching a workflow that effectively uses cloud environment for data analysis and storage, using scalable compute via kubernetes and scalable storage using Zarr on S3-like storage.
- The programs supported and supplied by XSEDE are only paralleled by a few other computing resources. More so, if the program is not available, the XSEDE technical assistance group quickly responds to issues/complications.
- The XSEDE cyberinfrastructure went a long way towards leveling the playing field or democratizing bioinformatics, as far as I am concerned. (I have already mentioned the benefit of having access to ECSS help.)
- The XSEDE infrastructure makes it possible to quickly and easily engage collaborators, both external and internal, in joint HPC projects.

Theme 3: Program Capabilities, Facilitating Research

- Ability to run at certain times in dedicated queues.
- accelerate my computations
- Access to a computing resource that does not charge for its services (AWS).
- access to computing was by far the most important
- Access to cutting edge technology is crucial towards the advancement of science, and to educate the young minds that will approach the problems that will shape our future.
- Automated quality control
- Batch parallel computing
- Capacity to run a large number of simulations and ability to request support without funding
- comet is faster than what we are capable of at my home institution.
- computational resource
- computational time and the size of the systems considered that could lead to qualitatively new physics
- computing resources are vital for us, without them I couldn't do my job.
- confidence to work on a supercomputer.
- ease of transferring across systems
- Easy access and high-quality + very fast helpdesk
- Education and access to not just computing resources but "latest" computing resources
- Enabling access to a high-memory computing resource that was unavailable to us without paying for it.
- Enriched infrastructure
- Extensive cooperation
- Super computing power
- Fast I2 = good. Large amounts of "free" cloud computing resources after having gone through the granting process.
- Fast in Molecular Dynamic Simulation.
- For my group, not much else: we just need lots of large parallel compute power and modest backup storage. Sorry to be so boring.
- Gave us access to high-speed and high capacity computing not available to us on site.
- Helping various researchers solve issues and get their work done.
- High performance computing resources. (GPUs)
- High reliability and ability to plan my research
- Hopefully, it will provide a platform to have Jupyter notebooks running Haskell (this is important) open to students in my university classes and also in summer schools at various institutions.
- HPC resources for both teaching and research that I do not have to build and maintain.
- Access to very effective, timely help getting things configured and running.
- I am a new assistant professor working in computational physics. HPC systems are essential for my research. As we do not have access to computer clusters in our university (with the exception two small clusters that are inadequate my calculations), XSEDE has been essential to my research. This year, it has been used by my summer REU and my graduate student. It will be even more important starting next academic year when I will hire 2 postdoctoral researchers and another graduate student.
- I am both a Physicist & Engineer. I expect to be using this computing resource in the future. The value of your infrastructure is limitless.

- I mainly use it for number crunching only.
- I use XSEDE resources only to run VASP calculations
- Indirectly, the available computing resources have provided the opportunity for me to design future computational experiments that I would have not previously considered. These "thought experiments" are important to developing a healthy scientific practice, even if I do not actually perform every experiment.
- It added the ability to seamlessly connect large datasets housed on Wrangler-IU with software built on the Jetstream-served VM.
- It allows us to perform a project that we would otherwise have had to ask for funding to buy lots of cores for a condominium HPC machine on campus which would have made our grant proposal too expensive. It also allows us to make the image available for other scientists to use for their large projects.
- It has provided a great collaborative environment for multi-institutional and multi-disciplinary projects that would have been nearly impossible otherwise if we only had access to individual university resources.
- It is a large resource where I can run a job that is massively parallel. It also provides a way to archive large amounts of data to tape at a reasonable cost.
- It provides access to new architectures (like on Stampede2) that I wouldn't have access to otherwise. The allows me to see how my code performs differently/better on those architectures. Also, as a developer of an open-source community code, I know that if I can get the software installed on an XSEDE cluster, anyone with an XSEDE account could do the same, reducing the need for me to help users install the code on their own clusters. I'm also excited about setting up a Gateway, although I haven't looked into that in much detail yet.
- It was mostly the computing resources, and the human help getting started.
- I've only started to evaluate how XSEDE can help my research. I teach at a primarily undergraduate university and most research happens in the summer.
- large number of computer nodes to run multiple simulations
- Large scale resources in terms of number of CPUs available for parallel programs.
- Larger memory and more processors enabled computations that would not be feasible with the limited computational resources at my institution.
- Long term data storage.
- lots of CPUs/GPUs and flexible way to use them with all the software my lab needs.
- Much more work accomplished, and could tackle more ambitious projects
- Nodes with large RAM memory
- Novel cloud-based systems like Jetstream which I would not have access to otherwise. I do have access to a campus HPC system already
- Provided processing power needed for my research.
- Providing leading computational resources such as P100 GPUs.
- Quick startup in parallel computing study.
- Scale of my applications to world-wide user communities
- Science Gateway hosting on Jetstream
- Since XSEDE systems provide support for a variety of new technologies and computational paradigms, it's easy for me to test out new approaches for my software.
- Single source of computing resources with the scale and time allocation required...
- Some things simply cannot be done without parallel computing resources
- Speed and scale
- Speed.
- Storage space for large files produced with NAMD

- The ability to do large scale computational studies.
- The ability to make available several of them, which could be tailored to my needs
- The ability to test a new computing resource.
- The ability to undertake science in the cloud.
- The calculations are much faster. The XSEDE staff is helpful.
- The capability to conduct tasks/scripts in parallel.
- The computational side of my group's work (complementing experiment) would not have developed in the first place if we did not have this access. We collaborate with an experimental group, and while our experimental partnership is nice, computation is the key value we bring to the collaboration.
- The computers systems in XSEDE is very helpful for my high-throughput calculations.
- The extended support was critical for researching a workflow that effectively uses cloud environment for data analysis and storage, using scalable compute via kubernetes and scalable storage using Zarr on S3-like storage.
- The fact that XSEDE provided a parallel file system which allowed me to test concepts for I/O writing using distributed memory.
- The most valuable asset of XSEDE is its vast expertise in all areas of scientific computing. Also, its broader impact in training and education.
- The new and powerful stampede 2 KNL and SKX nodes
- the number of cores on Xsede can handle large jobs
- The programs supported and supplied by XSEDE are only paralleled by a few other computing resources. More so, if the program is not available, the XSEDE technical assistance group quickly responds to issues/complications.
- The startup allocation process is quite helpful, and my performance testing with it actually informed me on local hardware that I ended up purchasing. It is great for exploring utilization and administration strategies.
- The user portal is very nice and gives a lot of info about how much resources I have consumed and what is recommended etc.
- The XSEDE cyberinfrastructure went a long way towards leveling the playing field or democratizing bioinformatics, as far as I am concerned. (I have already mentioned the benefit of having access to ECSS help.)
- The XSEDE cyberinfrastructure environment is a grand facilitator of performing research. XSEDE is a state-of-the-art research platform.
- The XSEDE infrastructure makes it possible to quickly and easily engage collaborators, both external and internal, in joint HPC projects.
- There is Matlab installed in COMET that allows me to analyze the outputs while running the simulations.
- To process and share data from self-built applications.
- tuned software and HPC has been really useful. Also for testing large data sets it has been essential for the massive scale of data it allows exploration of.
- We can perform large-scale numerical calculation easily.
- We can try out leading edge hardware.
- we could not have done our simulations without this.
- While my local resources are equivalent to about 300,000 SU per year, which is similar to the allocations received from XSEDE, the considerable value provided by XSEDE is the ability to obtain compute intensive results in a much more timely manner once the viability of a particular course of action has been established locally.

- XSEDE (comet in specific) has made it possible for us to mechanistically simulate HIV infection and immunotherapy treatment. Our results have important implications on developing future HIV treatment.
- XSEDE has been invaluable for me to achieve my career goals.
- XSEDE has empowered me to expand the scope of my research and ask larger questions.
- XSEDE is uniquely well-maintained and optimized, which saves significant amounts of research time and allows for more efficient research simulation work.
- XSEDE provides a highly consistent and extraordinary computing platform to support our computational modeling projects. This greatly facilitates even career transitions between different institutions.
- XSEDE provides a reliable HPC-infrastructure which enables me investigate and explore new research problems with ease. Without XSEDE probing these problems or using the methods would be just impossible! In other words, "XSEDE is the oxygen of my research activities".
- XSEDE provides the of computational resources that allows us to analyze the enormous amounts of genomic data that we have (50-100 TBs) which would take us significantly longer has we only had to use our local cluster (4 nodes, 24 cores per node).
- XSEDE resources have provided the means to reduce the time to completion of some of my simulations by up to a factor of two, as compared to other HPC systems. This has been critical for simulations that are time sensitive or very long.
- Access to a significant number of VM's (via OpenStack on Jetstream) coupled to a significant storage system (Wrangler Storage). These are key to our project.
- Access to state of the art technology on Stampede 2.
- Access to unique software.
- All the software that are installed.
- At this point in my research access to computing resources is priority.
- Ease of access and support in getting the performance we needed.
- expert help. easy to use pipeline for neuroscience simulations (NSG). free compute cycles.
- Exposure to a diverse environment to test, port, and develop software
- Help support, experimental platform
- I benefited most from their training on high performance computing methods, such as open MP and open ACC.
- I used XSEDE to teach a graduate level course in parallel computation. The unique value to the students was the ability to write programs and run programs on a world class super computer facility.
- I wouldn't say it's unique, but discovery of new (to me) methods of analysis/simulation.
- It is enabling me to share this facility with students in Nablus, Palestine. That is priceless.
- Very prompt and responsive user support. The queues are well-managed such that my jobs start promptly. I have heard that they will issue refunds for service units if the resource was malfunctioning, though I have not had this come up in my own work. Even so, that hasn't always been my experience on other resources.
- When problems arise, XSEDE fixes them rapidly. Not having to worry about management of computational resources saves a large amount of time.
- wide range of machines and software, tools, libraries

Theme 4: Access to Knowledge Base and Resources

- A coherent set of software and support services across different service providers.
- A good feeling for being on national resources
- Access to a significant number of VM's (via OpenStack on Jetstream) coupled to a significant storage system (Wrangler Storage). These are key to our project.
- Access to additional licensed software
- Access to software like QCHEM
- Access to state of the art technology on Stampede 2.
- Access to training materials was very beneficial to stay up to date with the latest trends and technologies for high performance computing.
- Access to unique software.
- Access to well-managed compute clusters for research is like access to clean drinking water.
- Acquaintance with visualization software, learning more about parallel programming from tutorials, obtaining research allocations for classes as well as research.
- All the software that are installed.
- At this point in my research access to computing resources is priority.
- Availability of preinstalled software
- Availability of some commercial software
- Technical help
- Data storage
- Data storage and management
- Exceptional resources and support were extremely valuable in learning a large scale high performance computing infrastructure.
- Having access to XSEDE resources and people makes working at a school without these resources and experts on campus tractable.
- I don't understand what "XSEDE cyberinfrastructure environment" means exactly. Do you mean XSEDE portal, user guide, and materials? Then, they are very essential to me.
- Provided opportunities to apply for other computing resources like Anton
- Made me more involved into the scientific society.
- IU Use Jetstream in training and it's an eye-opening experience for participants to learn about XSEDE and how easy it is to use Jetstream to access resources that they assumed had insurmountable learning curves.
- Knowledge on what are the issues and transparency to understand the contexts and points of views.
- multiple data analysis software package
- Provided New tools and Help to extend my tools
- See what other computing resources exist, discuss computing with other scientists.
- The training resources are well designed and of high quality.
- The tutorials, training, and documentation is very useful.
- The webinars and outreach activities inform me how others use the XSEDE resources and inspire potential alternative approaches in my own work.
- The webinars are something I've used on occasion.
- The workshops were quite helpful
- There is a considerable amount of knowledge available through the website and the training which has proven invaluable in the execution of my job.
- There were more opportunities than I could use by a huge factor.
- wide range of machines and software, tools, libraries

- XSEDE also provided access to software that was already installed.
- XSEDE is versatile and diverse in the range of resources. I and my team were able to experiment with different ways of implementing the software. The fact that tools were available and well documented motivated us to try new things and to learn new things. At some occasions, we were able to make key observations because of those available options.
- Integration of training and hardware/software.
- It is a large resource where I can run a job that is massively parallel. It also provides a way to archive large amounts of data to tape at a reasonable cost.
- Novel cloud-based systems like Jetstream which I would not have access to otherwise. I do have access to a campus HPC system already
- One of my favorite things was the ease of use of Bridges and XSEDE. Even though I am a CS student, sometimes supercomputing centers can be intimidating, but the very detailed online documentation and help service made it very easy.
- On-line courses and recorded teaching material are very useful to leverage my skills and knowledge
- The combination of (high quality) educational support and resources is very important. The DDT is great too.
- The XSEDE provides the technical help for us to work on XSEDE supercomputer, and software told for us to do the analyses.

Theme 5: General

- Very good
- Visibility in publications
- The price is very reasonable.
- Training opportunities are much more available on Xsede.
- XSEDE provides a highly consistent and extraordinary computing platform to support our computational modeling projects. This greatly facilitates even career transitions between different institutions.

Theme 6: Invalid

- At this point, it's not clear that there is any value. I'm not that familiar with the history, but it almost looks like a middleman organization created for political reasons.
- None, but I am not looking for that.
- None---the computing resources are the point.
- Your service was a drain on our productivity. The world would be better off without your service.
- There are 8 responses in this category that provided comments such as “N/A”, “No”, or “No comment” without any specific comments or suggestions.

Comments to Question: How could XSEDE be more useful to your research or educational program? (For example, are there new resources or services that would be useful? Are there new features or improvements to existing services that would be useful?)

Theme 1: Access to Resources

- Ease the use of external libraries (e.g. provide sudo within virtual environments)
- Faster cores for NAMD simulations. More supercomputers available. It is nice to have many cores available in Stampede2, but these are somewhat slower, so we need to use more cores and scaling is not always optimal. Bridges is faster but queues are sometimes busy. It would be nicer to have more options, with faster cores.
- Having more computational nodes available
- I periodically teach tutorials in Deep Learning. Local computing facilities are no longer enough. Reserving GPU nodes for the class would be very useful. I have not checked if such an opportunity exists, probably it does. Getting latest and greatest Power9 nodes would be very useful for Deep Learning research.
- It would be great to be able to host a Jupyter Notebook server that has access to XSEDE resources and data. Because we have many TB of data, this is one of the few feasible ways to share it. There might already be a way to do this, but I don't know how.
- It would be great to have more connectivity to CyVerse.
- Maybe an easy way to apply for a course allocation that would give access to a variety of systems.
- More computing resources will definitely benefit my research.
- More demo accounts and easier to integrate local resources - installing custom (but general use) software builds has been a time sink to getting applications move from local cluster to use on XSEDE.
- Provide computational resources for HPC based computational science classes
- Providing access to my program of choice (open source and some paid programs) is critical.
- Rapid access to resources.
- Resources for students (very short sign-up times) would be helpful.
- Like a gateway - but without the forced and often not-applicable topical contexts.
- I would love for XSEDE to provide a few small new architectures. Or even just simulators for new architectures. https://en.wikipedia.org/wiki/D-Wave_Systems Or memristor based hardware. Or the ability to easily access resources for domain tutorials. That is, to run more than toy problems for our software tutorials, it would be great to have access to a significant number of nodes for a couple of days or a week. This would require guest logins and dedicated nodes or, less desirable, batch priority.
- It would help to have queues with longer time limits on Comet and Bridges.
- It would help to have more computational chemistry programs available.
- It would help to have better and more accurate documentation of how to use software.

Theme 2: Expanded/New resources

- A smoother data archiving tool would be nice. Also, more GPU resources would be useful.
- Automatic job monitoring applications that could track when certain sets of jobs finish, and then submit new jobs according to a set of instructions.
- Bridges specific comment: please implement a job start prediction service. This would be very useful but does not exist in any meaningful form. The now defunct Darter had a wonderful command line that allowed you to look at the backfill and design short jobs accordingly.
- Continue to innovate and try out techniques to broaden availability and approaches.
- Getting a stable Haskell environment would be key.
- GPU nodes
- Virtual host (Jetstream)
- Apache Airavata service (SciGAP)
- Heterogeneous data integration and high resolution simulation platforms
- I am wondering if would be easier for my students to learn about parallel programming through a science gateway/web interface rather than command line scripts, because of the Parallel Java tools we use.
- I would like a "find a collaborator" search tool.
- Include some more software.
- Allow the home folder to be larger (~50GB)
- increase the working disk space is crucial.
- Installing more software for scientific research such as phono3py, phonopy, and xcrysden
- Introduction of self-learning algorithms to help eliminate learning/training might help improve existing services.
- It would be great if there was a backfill queue, similar to BlueWaters. There, users can see jobs queued and amount of nodes free and nodes reserved for the queued jobs, and you can use that information to create jobs that can take up the "backfill" (i.e., nodes reserved for other jobs but aren't used yet because they don't have enough nodes reserved). Jobs on the backfill take a smaller part of the allocation cost, and users are encouraged to use the backfill so that every node is at 100% uptime. I found that my jobs on Bluewaters ran much faster, even during high demand times, if I could formulate my job to fit within the backfill.
- It would be helpful to have more GPU resources.
- Larger number of conventional nodes with fast CPUs instead of GPU-type and MIC-type processors (GPUs are still not very convenient for large scale modeling with hierarchical time stepping).
- Loading modules is quite easy. But several programs have jar files that are not easy to find, and thus hard to use. Adding programs to my own directory has been my solution, but having a location for jar files or modules for specific programs would helpful.
- Maybe allowing the integration of GPU nodes with distributed nodes (to be able to do MPI+CUDA programming which is a combination of hybrid parallelism that I'm interested in exploring)
- MDS, mmpbsa calculations
- more benchmarking, resource comparison and optimization capabilities, larger GPU clusters
- More GPUs
- More Jetstream please.

- More of these resources is good. When using Jetstream lately, I believe that would be an idea model moving forward given flexibility, etc.
- More resources would certainly be helpful.
- More systems which diversify XSEDE's reach. High-memory, flexible, long running times. Not all applications can leverage thousands of cores
- My work includes analysis of genomic data. Our data is mostly huge and require a lot of disk space. If you can improve the data storage resources that will help researchers like us.
- Our current research makes heavy use of gpu-enabled code for molecular modeling and simulation purposes. Although we have an in-house computation cluster with several gpu nodes available, XSEDE provides access to more powerful gpu processors. A larger resource pools for parallel gpu jobs would be quite helpful.
- The main thing that would be much more useful is if the resources were up-to-date with the latest GCC compilers. For example, each time a GCC major version reaches minor version 3 if that compiler then became available on all machines. The reason is that there are bug fixes and new features in newer compilers, so having access to them would allow us to say use C++17 already.
- We still see high demands in computational capabilities. New resources with higher performance and computational capabilities are always useful.
- XSEDE could be more useful to my research if it would be expanded and be able to provide more computing time/HPC facilities. Machines are usually oversubscribed by a factor of 3 or more, and the awarded computing time is often cut down by that factor, negatively impacting the quality and breadth of the research activities conducted.
- Currently in molecular dynamics simulation, a push toward many independent simulations run in parallel appears to be building (methods such as WESTPA, Seekr, etc.). This is on top of already popular methods such as temperature/Hamiltonian replica exchange simulations, where several simulations are run on their own resources, but periodically communicate between one another to exchange subsets of information. As such, the continued development of and/or technological upgrades to largely GPU-oriented clusters, such as XStream, will continue to be incredibly useful in this field.
- Ease the use of external libraries (e.g. provide sudo within virtual environments)
- Making the machines more reliable.
- More GPU resources!
- Perhaps I missed something because my graduate student manned the statistical analysis work in XSEDE. But my understanding is that XSEDE only permits certain software environment. Some statistical models are written in languages in less well-known/popular language like WinBUGS. It would be great to able to run those programs with the amazing computing resource of XSEDE.
- Perhaps, XSEDE can collect successful user scripts for compiling and running programs.
- Compiling the same code using GNU and Intel compilers would be very beneficial.
- Resources for students (very short sign-up times) would be helpful.
- Like a gateway - but without the forced and often not-applicable topical contexts.
- I would love for XSEDE to provide a few small new architectures. Or even just simulators for new architectures. https://en.wikipedia.org/wiki/D-Wave_Systems. Or memristor based hardware. Or

Theme 3: Improved Functionality

- 24/7 uptime operational support with minimal downtime on cloud computing resources.
- Additional nodes and a longer queue
- Automated classroom set ups for teaching on the cloud or Jetstream. Right now, it takes too much time to set up individual log-ins, etc. It would be better if this could be automated in the future.
- Better Multiuser controls , particularly for classroom use
- currently I am using the Stampede2 resources.
- The code, CP2K, that I am using doesn't deploy the full capacity of the KNL chips.
- It'd be great if people in the ESCC team spend some time to see if they can improve the code.
- Currently in molecular dynamics simulation, a push toward many independent simulations run in parallel appears to be building (methods such as WESTPA, Seekr, etc.). This is on top of already popular methods such as temperature/Hamiltonian replica exchange simulations, where several simulations are run on their own resources, but periodically communicate between one another to exchange subsets of information. As such, the continued development of and/or technological upgrades to largely GPU-oriented clusters, such as XStream, will continue to be incredibly useful in this field.
- data archive plan
- I hope FileZella can work.
- I like Agave, more effort should be devoted to making it work faster and more reliably. also, further doc is needed as examples do not exist and figuring out how it works is an adventure.
- I'd like to see some further standardization across sites so that things work the same as much as possible.
- If it were faster, lol.
- Improved performance and availability of archival storage systems (TACC Ranch) would be useful.
- In terms of cloud resources improved compatibility with other providers would be helpful for the migration of research to production.
- It would be more helpful if we could mount local volumes, to avoid copying a lot of data back and forth each time we log in. This proved very difficult with Jetstream, which is where we had to use it.
- It would be nice to run commercial codes on the Jetstream boxes, such as, Ansys/Fluent, Abaqus, Adams. Unfortunately, their licenses usually limit use to local lans or lans within sub fifty mile ranges.
- It would help to have queues with longer time limits on Comet and Bridges.
- It would help to have more computational chemistry programs available.
- It would help to have better and more accurate documentation of how to use software.
- Less time limits per job. Some of the requirements do not allow computing properties of larger biomolecules.
- Less waiting time for batch job, more powerful mainframes
- make the logging easier
- Making the machines more reliable. We've been
- More GPU resources!
- Metadata, automated performance reporting and run time predictions would be great. Support for some third-party software (with NSF or private funding supplements) would be very useful.

- One of our programs in my parallel computation course was to measure the performance of the student's code. The scheduling policies on the particular super computer (comet) made the performance vary from run to run. More controls over scheduling policies would have helped make the program performance more repeatable.
- One the XSEDE User Portal website, the MyXSEDE/Jobs spreadsheet for Stampede2 does not show the jobs name like the Comet sheet does. Using the Job ID and start/stop times to get SU charges for particular jobs is inconvenient.
- Perhaps I missed something because my graduate student manned the statistical analysis work in XSEDE. But my understanding is that XSEDE only permits certain software environment. Some statistical models are written in languages in less well-known/popular language like WinBUGS. It would be great to able to run those programs with the amazing computing resource of XSEDE.
- Perhaps, XSEDE can collect successful user scripts for compiling and running programs.
- Compiling the same code using GNU and Intel compilers would be very beneficial.
- Reduced queuing time.
- storing and hosting complex and large research data sets.
- True HPC services ... clustering, MPI, Infiniband ... and ability to quickly deploy containers via Kubernetes, using either Docker or Singularity
- We've been struggling with the VMs because they're not allowing us to run a project that we're able to run on a desktop. As such, we're having to redo our code so it can be run in batches.
- A smoother data archiving tool would be nice. Also, more GPU resources would be useful.
- I did teach a class using XSEDE. I had to design step-by-step tutorials on how to login, how to set up a batch run. This information was taken from User Guides. Yet, it was very important for students not familiar with HPCs and scientific computing. My students were really reliant on those step-by-step guides at least for half semester. I would imagine that collecting such tutorials, may be producing new ones could be beneficial for those requesting educations allocations.
- As far as my research goes, XSEDE is doing a great job and is fully meeting my needs. May be a better SSH utility for Windows would help.
- More systems which diversify XSEDE's reach. High-memory, flexible, long running times. Not all applications can leverage thousands of cores
- XSEDE could be more useful to my research if it would be expanded and be able to provide more computing time/HPC facilities. Machines are usually oversubscribed by a factor of 3 or more, and the awarded computing time is often cut down by that factor, negatively impacting the quality and breadth of the research activities conducted.
- Yes, I would like to see a tool that generates the needed statistics for the allocation request renewal automatically. This is really a time-consuming burden that could be automated from your side.

Theme 4: Allocation

- Allow a certain number of long queue requests for the allocation year with a long queue job allocation being 96-168 hours.
- I need more computational time
- I only need more computing time.
- I will appreciate larger sizes of allocations and the grant does not become more and more competitive.
- I would love more/larger allocations!
- It would be great to increase capacity. My current allocation award was cut of 20%.
- Load balancing between Jetstream IU and TACC
- Longer runtimes for some of my projects would simplify many of my tasks.
- longer wall times for serial jobs (Gaussian09). I only run on a single node, but the wall time is still 48 hours. Some calculations (frequency) cannot be restarted and must complete on a single run or there is no useful data.
- More SU allocation, less percentage reduction
- My allocation expired last year so we didn't used it much since then. Hopefully we can get a new allocation soon.
- The allocation process is completely whimsical and random. It should be taken out of the hands of technicians and delegated to the NSF program managers.
- The biggest drawback of XSEDE is that it sometimes takes a long time to run jobs. This can be very inconvenient when trying to run small jobs.
- There should not be a cap of approximately 4 hours to use the machine.
- To be able to switch our environment into XSEDE, we would need better uptime. As we are collecting and serving seismic data 24x7 (some of it real-time), the maintenance outages are fairly impactful to us and all the researchers that use our services and data. I know this isn't the current intended use for XSEDE, but that is more of what we need.
- Uninterrupted access
- We really need Wrangler mounted to our instance(s). The current limit of 20 TB attached volumes is just too limiting for our needs.
- XSEDE needs more compute power. Every year, our proposals get approved but then cut by ~50%. So how are we supposed to our NSF funded work with 1/2 the time? It makes no sense and is really frustrating: should we write more NSF grants for good scientific problems and then not deliver the results on time because there aren't enough computers? Or not write grants as often so that the smaller allocation will actually do the job?
- Yes, I would like to see a tool that generates the needed statistics for the allocation request renewal automatically. This is really a time-consuming burden that could be automated from your side.
- Having more computational nodes available
- Maybe an easy way to apply for a course allocation that would give access to a variety of systems.

Theme 5: Training/Support

- A tutorial(s) on machine learning would be useful
- Better help documentation for someone who has never used a super computer before
- Education on parallel programming using C++ tasks/threads
- Having experts for data visualization.
- Having tutorials/courses of training in the Coursera/EdX format will be helpful.
- I did teach a class using XSEDE. I had to design step-by-step tutorials on how to login, how to set up a batch run. This information was taken from User Guides. Yet, it was very important for students not familiar with HPCs and scientific computing. My students were really reliant on those step-by-step guides at least for half semester. I would imagine that collecting such tutorials, may be producing new ones could be beneficial for those requesting educations allocations.
- As far as my research goes, XSEDE is doing a great job and is fully meeting my needs. May be a better SSH utility for Windows would help.
- I think the growing number of XSEDE-related webinars is doing a great job. More of these webinars and their documentation will help researchers around the country.
- Is it possible to provide a mentorship or collaboration for people like me who has a very limited background of bio-informatics/sequence analysis?
- JupyterHub with training materials in the form of Jupyter notebooks that run on XSEDE resources (Cloud).
- Make it easier to get help to use XSEDE resources.
- Improve user-friendliness and clarity of online document, and also of search functionality.
- Maybe online training material that we look on our time, but I guess this is already available.
- Because I use c++, maybe some training courses available on line
- More beginner oriented help content
- More detailed tutorial in optimizing the use of SUs in specific type of nodes.
- More experience with kubernetes on Jetstream would be very useful.
- More training for humanists
- More training on computational chemistry/molecular modeling.
- more training opportunities for new hand
- more tutorials/web trainings
- Offer more quick startup materials.
- Provide more tutorial on data visualization options
- Ratio of demands vs XSEDE FTE's to assist in research projects appears disproportional. Additionally, perhaps some sort of incentive program for ECSS staff to stay peripherally involved even after the "project" is up and running?
- Some more example parallel codes in the online documentation would be useful for beginners.
- some sort of introduction tutorial should be mandatory. speaking for myself and other students new to this sort of computing, the learning curve is quite steep.
- training courses on work-flow management
- User summit or conferences (mixed with 1 day training + 2 days of talks/posters) could be an option.
- We could use help in improving our performance capabilities on new computing architectures (hybrid chips, etc.).

- Well, thinking back on how confusing just getting logged in and running was for me, and now going through the site and seeing the training sections; I would say maybe highlighting the training section for new users. Maybe requiring a quick tour to at least be aware that these resources are pretty close at hand. Especially sense the course I was taking through Berkeley did not seem to point me in that direction... or maybe I missed the email. Also, brief 10-15 second clips of process steps could help. Would speed things along, rather than going through lengthy videos of people talking, some of which are 4 or so hours in length.
- When I started on XSEDE systems, I struggled to get a guide on "good and standard" practices on specific XSEDE machine. I had to use my past experience to make educated guess.
- While most systems are similar, there are small differences and differences in installed softwares. it would be good to have a system specific guide in the user portal, a one-stop pdf that tells us the wall times, sample slurm scripts, currently loaded softwares etc.
- I like Agave, more effort should be devoted to making it work faster and more reliably. also, further doc is needed as examples do not exist and figuring out how it works is an adventure.
- Introduction of self-learning algorithms to help eliminate learning/training might help improve existing services.
- Metadata, automated performance reporting and run time predictions would be great. Support for some third-party software (with NSF or private funding supplements) would be very useful.

Theme 6: General

- all items are useful
- As a new faculty, I feel like I'm always getting started with things. This involved getting a startup account, using the resources, and NOT immediately submitting an allocation proposal (this because I had a ton of other things happening locally). Having a *very* limited access route for system performance testing would be nice. I will likely look into a second startup or chat with our local campus champion for strategies forward.
- Data-focused/analytics resources are most useful to me.
- Fewer emails
- For us to use XSEDE resource for anything other than a prototyping environment we require longer term allocations/agreements than a single year.
- Great help to my current research.
- I am foreseeing XSEDE as a very useful platform. However, we are not yet at the stage to scale up our computational methods.
- I am not aware of anything. It works very well for me as is.
- I am satisfied with the current state of affairs
- I am satisfied with the way it is.
- I at this time cannot suggest any new resources that I need.
- I can envision some useful improvements, but I can only imagine by continuing the study performed.
- I think so far the XSEDE resources and programs are excellent and should continue.
- I think XSEDE offers many great resources, we just need time to start taking advantage of them all.
- It was just a matter of me finding the time to use the environment.
- It works for me perfectly.

- knowledge of projects using XSEDE resources
- No
- no, satisfied
- Not sure at this time.
- Perfect so far.
- Research grant over a longer period of time than a year.
- So far it is great to me as it is.
- XSEDE provided with exactly what I needed at this time.

Theme 7: Invalid

- Can't think of any.
- I cannot think of anything right now.
- I do not know.
- I may have answers to this in April.
- N/A (career change in fall 2017)
- N/a. A dedicated object store?
- There are 7 responses in this category that provided comments such as “N/A”, “No”, or “No comment” without any specific comments or suggestions.

Comments to Question: Do you have any other suggestions or comments regarding XSEDE or the value derived from the National Science Foundation's investment in XSEDE?

Theme 1: Resources, Access

- In summary, XSEDE is doing a GREAT job using NSF resources. The help that I received from Mahidhar has been spectacular. Being able to have access to Comet has helped tremendously in many senses, and I hope to use the resources more fully in the near future.
- As a federal scientist, I encourage XSEDE to continue to make resources available to those US researchers who are not supported by NSF grants. Federal scientists are not eligible to compete for NSF grants, and the XSEDE computing resources are a critical mechanism for accessing and using supercomputing facilities.
- Better (i.e. more) archival storage
- Both the Comet resource itself and the support staff have been crucial for completing my research project. I have no complaints and am extremely thankful for the opportunity to utilize them.
- Excellent resource for the community
- Great resources overall and system functions well. These are essential for fundamental research. However, we are clearly losing to other countries in Europe and Asia, where there appear to be more resource per faculty that works in numerical modeling.
- I am so very grateful to those who make these resources available, especially important to a "little fish" like myself. Thank you for all you do to make this resource readily available!
- I sincerely hope that the NSF continues to make XSEDE available. For those of us at small institutions without the means for local, large-scale computing resources, XSEDE is vitally important. Thank you!
- I want to once again stress the importance of XSEDE to researchers at small schools who have the potential to make a large impact on the field. Providing these students with ability to gain first-hand experience in conducting competitive science will dramatically improve their efficiency within the larger graduate institutions and industrial research teams that these students will later pursue.
- I wish to have more computing resources that can be made available through XSEDE.
- I would like to make sure that all XSEDE trainings are available afterwards if I missed a class. At least in the past this was not the case most of the time.
- I'd like to see mailing lists like the Campus Champions list opened to all. I was a bit surprised that they're currently operated as a sort of private club that you need to be recommended into. This would seem to limit their ultimate utility. It's hard to see the benefit--it seems kind of anti-science.
- It is invaluable resource that is even more essential for researchers in smaller colleges and universities that do not have computer clusters housed on-campus. This also frees the researchers to do their research, while freeing them from having to create and/or maintain a cluster for themselves.
- It's a great resource. I really really appreciate.
- More GPU resources.
- more resources at more locations
- strive for a more seamless environment
- Variety of architectures
- More resources, please!

- On Jetstream, now that we are moving beyond the R & D phase, it is essential we have very good uptime, operational availability of cloud resources.
- Providing access to the paid program and integrate workflow in XSEDE computers to virtual screening.
- Seems like more NSF programs should require or strongly advocate utilization of XSEDE resources for projects being proposed.
- thank you for maintaining and supporting this resource. it is critical to our science and we are very grateful to the XSEDE team for their efforts and support.
- The ability to use free, shared HPC resources for bioinformatics analyses (e.g. transcriptome assembly and annotation) is critical for democratization and progress in data-intensive biology
- The benefit of access to these national resources for students and faculty at smaller institutions that would never have the ability to have them on their own is invaluable.
- The XSEDE program is vital to conducting research at Universities with no computational facilities. Such facilities are very costly; therefore, administrators are not willing to spend their precious dollars.
- The XSEDE program makes resources available to all persons with high performance computing needs.
- This is an invaluable resource to small colleges like the institution I work in. It allows me to do work on a much larger scale that I could never do with our own resources.
- Would be interesting to see what other SocialSci / Econ / Finance / Business research problems could be brought to XSEDE that doesn't require ECSS, this is not a resource that everyone can get/use.
- XSEDE is a truly exceptional resource -- it makes the access to HPC resources democratic and fair.
- XSEDE seems like a vital resource for transforming institutional server and campus cluster-class applications into the big world of big data analysis and synthesis. We have a large data community and as we continue to put online and aggregate an increasing quantity of environmental data, having easily accessible, agile, and extensible XSEDE computational resources provides research infrastructure which allows us to get a higher "research return" on those national data and digitization investments than we would with smaller scale computational approaches, by making modeling across continental and global geographic extents with data of tens of thousands of species, extracted from hundreds of museums around the world, possible.
- I'm still pretty new in the XSEDE world, but it is proving to be an amazing resource, that is still largely untapped. NSF must continue this service, and more effort needs to be taken by all parties to advertise what it can do for researchers!
- The allocation process is completely whimsical and random. It should be taken out of the hands of technicians and delegated to the NSF program managers.
- Human time is the most important resource we have. To optimize productivity of my students and postdocs, there should be small allocations with guaranteed starting times/availability, better than the 'debug' queues.
- XSEDE made my research possible by providing affordable access to high performance computing resources. Without resources from XSEDE my project would have taken much longer and would be much more limited by computing costs.

Theme 2: Allocation

- Allocation process is kind of biased towards groups with funding. We don't have big grants that we can use to quote while applying for allocations. I use mostly the campus champion allocations. We would like to get our own production allocations for our research if you can make it easy for us.
- Hope I can get more allocations next time. Too much to calculate with my collaborators.
- I access XSEDE portal to see user guide, submit ticket, or submit allocation request. I don't know only my access is slow in XSEDE portal or other people are too. Turning the next web page in XSEDE portal is very slow. I tried login, or clicked "Ticket", then it takes about 10~15 seconds to open the web page.
- I hope more running time provide from XSEDE.
- Make multiyear allocations. Especially for Science Gateways that feed into large user communities. Also enable quick ways to get a supplement. Currently it is almost impossible to get extra computation time within an hour or two. This really hurts science gateways that rely on super computing infrastructure. Keep in mind users are unpredictable and no one can foresee their crazy ideas. Yet these ideas drive science.
- Make the allocation application process easier/simpler.
- More computing power.
- Please provide more summer research internships to students interested in applying HPC, HTC and data resources for their research or education.
- The allocation process is completely whimsical and random. It should be taken out of the hands of technicians and delegated to the NSF program managers.
- Human time is the most important resource we have. To optimize productivity of my students and postdocs, there should be small allocations with guaranteed starting times/availability, better than the 'debug' queues.

Theme 3: NSF Funding

- Give XSEDE more funding for more resources.
- I believe the US research program benefits tremendously with XSEDE and NSF should have long term stable funding to keep this going with matching increases with increasing expectations from the research communities.
- I thank NSF for supporting XSEDE. I hope NSF will continue finding XSEDE and provide more funding in coming years. Thanks, NSF.
- I think that XSEDE is a very high value program and that the NSF should invest more money in it.
- I use XSEDE environment accomplish the NSF grant. It's very useful!
- I'm still pretty new in the XSEDE world, but it is proving to be an amazing resource, that is still largely untapped. NSF must continue this service, and more effort needs to be taken by all parties to advertise what it can do for researchers!
- KEEP IT UP! By far one of the best investments of NSF money I am aware of, and absolutely essential to enabling novel research across academic disciplines in this country.
- Make sure that you instrument your service on key metrics like time to echo characters, and time to run jobs. Don't claim to have a viable solution when you don't. Please don't ask for NSF funds if you can't deliver a viable service.
- NSF should invest more in computing

- Well, it seems to me that XSEDE is a great investment for NSF because if we all can do our computational work on XSEDE, we don't have to purchase our own machines that we don't really need and that will become obsolete anyway. This way NSF can just fund one location and let us all use it instead.
- Allocation process is kind of biased towards groups with funding. We don't have big grants that we can use to quote while applying for allocations. I use mostly the campus champion allocations. We would like to get our own production allocations for our research if you can make it easy for us.
- As a federal scientist, I encourage XSEDE to continue to make resources available to those US researchers who are not supported by NSF grants. Federal scientists are not eligible to compete for NSF grants, and the XSEDE computing resources are a critical mechanism for accessing and using supercomputing facilities.

Theme 4: Support and Services

- At every level, XSEDE personnel have been professional, highly competent and pleasant to work with. XSEDE is very well managed; I have no complaints.
- I have thoroughly enjoyed the class and having access to the resources. Having said that, how close to the principles of KISS has this program been honed to? I feel that, me being a stubborn but persistent idiot, had a hard time trying to figure things out on my own. I wasn't sure which website (either the Berkeley Course or Xsede) that I should have gone to find out how to do things. Considering I had never had to ssh, or use a CLI, or even been properly introduced to a Linux life, everything felt like trial and error. After getting lost with MobaXterm (I could never get my Bridges account to work with it (my ignorance...)) I switched entirely over to a Linux environment, and it's been easier since. I realize now it was rash, but with too many other classes requiring something to be done in Linux, it felt easier to just make the jump and catch up. So, as this rant hopefully points out, being able to get quick results with a little video as a guide that this is what the outcome should be could have saved me some time, just because it was all new to me.
- I think it's highly beneficial for my future employment prospects to have training courses that offer a clear overview of the subject along with some focused hands on activities (like the current training structure). I include attendance of these training sessions on my C.V. and I believe that it indicates a working knowledge of introductory high performance computing techniques.
- Increase genomics support and ability to install tools for general use. Provide more help during major transitions.
- Jetstream is a great place to explore how research *could* be done on the Cloud, even if institutions end up going with commercial cloud. Especially important are the extended support that allows me to get an actual expert to help me with my workflow.
- Please consider:
    - simplify support for external software (e.g. apt-get installs, dropbox, python libraries, ...) in virtualized environments (as provided by AWS)
    - increase P100 GPU capacity
    - increase storage capacity of home directory
- Publicize its availability to users.
- The instructions for archiving data, for example to the ranch resource, should be clearer (and correct). This could also be much easier to use. Also, it would be nice if more information was provided about the queue time and the reasons why it is increasing, etc.

- XSEDE needs to continue to reach out and provide hands-on, in person workshops at smaller institutions to increase participation.
- In summary, XSEDE is doing a GREAT job using NSF resources. The help that I received from Mahidhar has been spectacular. Being able to have access to Comet has helped tremendously in many senses, and I hope to use the resources more fully in the near future.
- Both the Comet resource itself and the support staff have been crucial for completing my research project. I have no complaints and am extremely thankful for the opportunity to utilize them.
- XSEDE is the single factor that enabled our metagenome analysis that would otherwise be impossible for us to perform. I heard about it from a graduate student from my lab who had been using it, and I also really appreciated that we had a campus champion to provide support and guidance.

Theme 5: Contribution to Science/Research

- Great program that accelerates research across the country.
- More publicity and showcases of exciting research outputs using the XSEDE resources. I don't think many people in my domain know that XSEDE exists. I am a professor of transportation engineering. Ironically, more and more data become excessive in my area.
- Sharing of past research and online collaboration amongst individuals and institutions
- The XSEDE program is a wonderful investment. While I appreciate the computing resources provided by my university, the cyberinfrastructure environment provided by my university compares poorly to XSEDE. It's always a pleasure to use XSEDE resources for my work.
- The XSEDE program is hugely beneficial for molecular modeling research. It enables work that could not be otherwise performed by making powerful resources available to promising projects across the country. Continued investment in it just makes sense.
- This is a critically important resource, not only for research but also for education, my main focus.
- XSEDE is extremely valuable for my research.
- XSEDE is the single factor that enabled our metagenome analysis that would otherwise be impossible for us to perform. I heard about it from a graduate student from my lab who had been using it, and I also really appreciated that we had a campus champion to provide support and guidance.
- XSEDE made my research possible by providing affordable access to high performance computing resources. Without resources from XSEDE my project would have taken much longer and would be much more limited by computing costs.
- The XSEDE program is vital to conducting research at Universities with no computational facilities. Such facilities are very costly; therefore, administrators are not willing to spend their precious dollars.
- This is an invaluable resource to small colleges like the institution I work in. It allows me to do work on a much larger scale that I could never do with our own resources.
- XSEDE is an outstanding resource. My research remains severely hampered by inadequate speed and size of the computing resources, so I am strongly supportive of XSEDE increasing in capacity and speed -- it is vital for my work and the work of others.
- XSEDE seems like a vital resource for transforming institutional server and campus cluster-class applications into the big world of big data analysis and synthesis. We have a large data community and as we continue to put online and aggregate an increasing quantity of environmental data, having easily accessible, agile, and extensible XSEDE computational

resources provides research infrastructure which allows us to get a higher "research return" on those national data and digitization investments than we would with smaller scale computational approaches, by making modeling across continental and global geographic extents with data of tens of thousands of species, extracted from hundreds of museums around the world, possible.

Theme 6: Abilities and Functionality

- I find that the connection to Comet supercomputer becomes much slower via Wi-Fi, especially when I edit codes using VIM on Comet, which becomes much slow and inefficient.
- I have a rather large RNASeq dataset and storing it on pylon2 while working in pylon5 was not feasible as I continued to get "connection timed out" errors. This was rectified by syncing my directory to the local computation node, but I have since found it substantially easier to work solely on pylon2 after some of my dataset was cleared from pylon5 without warning. I know you have a wiper that will clean out old files, but after those read files were deleted, I still had files that were a month older than the read files that were deleted. I would have appreciated a "heads up" email that my data was reaching the time for clearing a day or two before it was deleted.
- NSF should develop mathematical solutions to replace rule/laws/policy based approach to introduce dynamical environments/systems.
- Please make sure they provide sufficient computer time for the NSF projects to accomplish their project goals.
- The nodes/cores improve all the time and so maintenance and building more and more computational power will be necessary as we try to solve bigger, more difficult, and more complex problems.
- The recent upgrade to Stampede 2 was painful for our research group. The data archive system sometime is not reliable in keeping the saved data.
- The vast majority of the of XSEDE resources appear to be targeting researchers, whose work is completed within a short time window and often with a certain amount of focus on large batch computing. This is not well suited for usage for longer projects or for use by NSF-funded activities such as data centers. We are quite satisfied with the addition of Jetstream, which is a much better fit for groups needing cloud-like resources.
- To consider to work with people from other regions of the world. Also to open the opportunity to create a P2P network of processing and storage nodes across the globe.
- XSEDE is a wonderful resource, which I am very proud of.
- Perhaps the main node can be prepared more computationally powerful since sometimes people use it for long compiling and/or running/testing small codes.
- XSEDE is an outstanding resource. My research remains severely hampered by inadequate speed and size of the computing resources, so I am strongly supportive of XSEDE increasing in capacity and speed -- it is vital for my work and the work of others.
- I access XSEDE portal to see user guide, submit ticket, or submit allocation request. I don't know only my access is slow in XSEDE portal or other people are too. Turning the next web page in XSEDE portal is very slow. I tried login, or clicked "Ticket", then it takes about 10~15 seconds to open the web page.
- Make multiyear allocations. Especially for Science Gateways that feed into large user communities. Also enable quick ways to get a supplement. Currently it is almost impossible to get extra computation time within an hour or two. This really hurts science gateways that rely on super computing infrastructure. Keep in mind users are unpredictable and no one can foresee their crazy ideas. Yet these ideas drive science.

- Please consider:
    - simplify support for external software (e.g. apt-get installs, dropbox, python libraries, ...) in virtualized environments (as provided by AWS)
    - increase P100 GPU capacity
    - increase storage capacity of home directory

Theme 7: General

- "Build it, they will come" .
- Arguably one of the best large scale investments by the NSF
- As a postdoc, I haven't used XSEDE resources over the last year because my current institution has sufficient computing resources, but I found them to be highly valuable in the past at my previous institution and plan to make further use of XSEDE once I start my own independent research career.
- Extremely helpful for our R&D programs.
- Focus on getting science done. Seems to be mission drift into other areas such as community building, workforce development, etc. While important as a whole, there aren't enough warm bodies to get science done AND dedicate time to these other efforts. I realize that seems self-defeating as the purpose of those efforts is to GROW more able bodies to assist, but most never end up being impactful in the work at hand.
- I am not really the target audience to this questionnaire. I am a practicing professional that used XSEDE a little bit while considering porting an application that I wrote to that environment.
- I am working in an area that combines Engineering, Medicine and Physics.
- Your last question does not allow for multiple areas.
- I feel XSEDE and the management are doing a very good job in meeting its mission and keeping itself open to suggestions and changes
- I hope it sticks around. I have benefited a lot as a researcher of modest means.
- I think everyone who uses XSEDE knows that it is extremely valuable to many researchers especially those at small and medium sized universities.
- I think that the application process for renewals is unnecessarily involved; it would be better if the renewal process was more straightforward once a project has proven to benefit from an XSEDE allocation.
- I think there is definitely a need to coordinate capacity building opportunities with federal government R&D units. I have a good deal of experience with this and would be happy to provide details via a follow-up conversation if it would be helpful.
- It is a great program and I feel very lucky to be a part of it. It has allowed us to perform scientific inquiry beyond our wildest dreams.
- It is great to have access to it for teaching and research.
- It should continue because it has improved the quality and quantity of the science I am able to do!
- It was an essential resource never equaled, and NSF can be proud of their embrace of it.
- it was crucial to take full advantage of the state-of-the-art techniques we developed for strongly correlated materials.
- Keep it going. Software and the infrastructure are never "done". A lot of things change just over the life of 1 system (a few years ago the GPUs were all about CUDA, now they're all about machine-learning and tensorflow with python).
- Keep it up!

- Keep up good work!
- Make it possible to unsubscribe from emails. I tried 5+ times and look! It still didn't work.
- No, I am very satisfied with what I am seeing ....
- No, we are thankful for this very valuable resource and wish to thank all their members.
- None
- None
- None at the moment.
- Nope
- Not at this time
- Not at this time.
- Nothing to add
- Perfect so far.
- Thanks
- This is a great program
- This survey is too long
- This survey should not be affiliated with any identifier, if it's to be truly anonymous.
- Very glad XSEDE exists and continues to mature. It is a great resource!
- XSEDE is doing great work! Thanks!

Theme 8: Invalid

- There are 11 responses in this category that provided comments such as “N/A”, “No”, or “No comment” without any specific comments or suggestions.

Comments to Question: If you rated any of the items in the previous question [about Software Services and Components] at a "3" or lower, please share with us your specific concerns and/or causes for your dissatisfaction.

- All the 3 are things I did not know existed or did not use. I'll have to try xdusage.
- As I don't have SMS or a smartphone, the need to purchase a $25 token in order to use TACC resources has led me not to use TACC resources, and instead work only at other sites within XSEDE.
- Bridges and Comet are not applicable to my use.
- can't due to question design; multi-factor authentication is a major hurdle for me to access resources, and there should always be a single-factor alternative (i.e., strong password)
- Direct login to SP resources with XSEDE credential using MyProxy and GSI OpenSSH - Can't remember the last time I used this (it's been at least a year, however worked great at that time; Using XSEDE credentials to log into non-XSEDE Web services (e.g., GENI and OrCID.) - Never Used (and there does not appear to be a way to un-select an answer); Globus Sharing Service -
  Never Used (and there does not appear to be a way to un-select an answer)
- Collaborative support did most of actual interaction with computer systems so I have no basis to judge
- did not use
- did not use Karnak
- did not use resources
- Didn't use them
- Do not use
- Do not use these services
- Do not use these services. Need an N/A choice.
- Don't use it enough to have an opinion
- For the items rated at "3" or below, I just rarely or never used them. It is NOT because I dislike them, just find myself no need for using them.
- For those rating at "3", I did not recall using the service.
- Get rid of the two factor of identification feature
- Graduate students are not eligible to serve as principal investigators. As such, I cannot access XSEDE resources.
- I am not aware of the benefits it provides
- I am not aware these, I only use ssh to login. I am not sure if I answer correctly.
- I am not familiar with the services other than Jetstream.
- I am not sure I understood the question. I log in using ssh through double authentication steps.
- I am not sure if I can login directly. I never tried - so also many other items in this section. I am not sure if those ever applied to me - sorry.
- I am not using Karnak
- I am still a novice using XSEDE so my evaluation may not be helpful due to my limited capabilities at this point.
- I will be looking for more training opportunities."
- I appreciate that multi factor authentication improves security. Globus is a lot less convenient than scp, however, so it'd be nice to be able to use RSA keys to log in directly to XSEDE resources like Stampede2.
- I chose "Never" for services that I (almost) never use.

- I completely understand that you need me to use 2FA to ssh into the single sign-in hub, but why wont the system accept my ssh key (instead of a password) together with my phone?
- I did not know xdusage or Karnak existed
- "I did not rate what I don't use
- I only connect using ssh command line"
- I did not use lookup command line tool.
- I didn't have specific expectations and didn't focus on that aspect of things, so I selected "neutral".
- I do not use bridge and comet
- I do not use these services.
- I don’t know what xdusage is.
- I don't familiar with this topic, and I feel that I never used them.
- I don't know what SP stands for. Anything that's a 1 should be an NA. Kinda a bad form because I can't unclick...
- I don't know xdusage and Karnak command, so I never used it before. I also don't know what is SP.
- I don't really understand what all these terms mean. I log in to Stampede via SSH. Would that be the first of the above possibilities? If so, I am satisfied. I usually do not have any problems with login.
- I don't use MyProxy and GSI openSSH nor do I use Karnak.
- I don't use them so I don' t know how well they work.
- I experienced unexplained login problems intermittently. Once when I logged in my home directory was empty when it should not have been.
- I gave a 3 above because I don't use them. you should have had an NA option
- I get the sense that helpdesk does not like Computational Chemists.
- I have always used "show_accounts" on comet and it has always worked. I have just tried "xdusage" but it seems to hang right now.
- I have had a lot of trouble multiple times when I shut off my Jetstream instance, then logging back on. For some reason the instance no longer recognizes my log in credentials and I have to have someone who is very savvy with programming edit the sign-in code. I could not have fixed this problem on my own.
- I have never used single sign-on hub.
- I have not used a lot of these things, or I don't know what they are. I left them blank
- I have trouble with transferring large files to Comet using Globus.
- I honestly don't know if the job prediction has ever given me a time. To be fair, I haven't tried to use it in a while because it never seemed to work. Not essential but would be nice.
- I just did not use XSEDE much due to a long wait in the queue.
- I just don't use this capabilities
- I just haven't used them. No dissatisfaction
- I login using ssh and specific credentials but my students have used the GSI Open SSH so it is important for them.
- I never used Karnak so I cannot comment on it.
- I often work and teach in a basement computer lab with limited cell phone reception. This makes multi factor authentication a nightmare for the students. There was also a major issue with my allocation accounting between the TACC and XSEDE user portals where I could not see how much the students were using for the course allocation. This caused us to go way over our original allocation. XSEDE personnel were very helpful in getting is sorted

out, but it was a major problem during an important part of the course that resulted in most of my students being locked out using of Stampede2.
- I only selected Never (1) for those tools that I do not use. These can be interpreted as Not applicable.
- I simply didn't frequently use these processes specifically rated low.
- I think the keys to the 1-5 were not correct, they are "Never, rarely, sometimes, often, always" not a concern level.
- I tried using the XNIT repo but for CentOS but at least at the time it did not fit with our systems because packages could only be installed in one specific location. We use the Environment Modules package to manage versions of packages and install the software on shared storage mounted at eg. /opt/modules/centos7... XNIT did not allow us to do this.
- I use a specific piece of software so I am not dissatisfied, I just didn't know how to answer.
- I'm not aware of those options hence I never used those
- I'm trying to parallel some java tools using through python using mpi4py. the worst thing is that sometimes the code works, sometimes it doesn't... So I need to submit jobs again, and again and again....
- In the past 4 months we have experienced a degradation in the reliability of the system. For example, Jetstream instances have gone offline, backend storage issues have occurred (on occasion we lost all data on an attached volume), volumes have failed to mount, instances have failed to delete. The system has generally been stable for the last month. This is an essential service for us, and we do hope that the issues are behind us.
- It is great to have access to this resources, makes bioinformatics faster
- It is very cumbersome to use the single sign on ssh client and to transfer files to resources such as stampede without logging directly into TACC.
- It was over a year ago so I don't recall exactly but it was very hard to use. I actually opted to pay for an entirely 3rd party system (paperspace) rather than use Xsede because it was so frustrating and didn't have the stuff I needed installed.
- It would have helped to have SP defined on each page.
- Jetstream is perpetually broken. Rarely am I able to unshelve or unsuspend an inactive node without intervention from the support staff. For a long time, I was unable to even start a new instance on Jetstream using resources at TACC. Comparatively, Indiana's resources seem to be less broken than TACC. Most of this is especially annoying given my work schedule - I am only able to use Jetstream on nights and weekends, when I will not be able to get an immediate response from support staff, so if something goes wrong it sets back the work I intended to do by a full day.
- Jetstream seems clunky to setup for a lot of uses so found it less useful for training and demos but could be a problem on my end.
- Many of them I have not used and did not rate
- Many of these things I have not used, but there was no option to indicate that.
- Most of my experience with PSC resources come in two areas: (1) Analysis and execution of jobs on the clusters via slurm, and (2) Provision of infrastructure support for web sites, databases, and systems code developed for our project. I am very disappointed on both counts. Slurm is an antiquated technology full of magic number parameters in batch files, uninformative and queue messages, running against hardware that seemed all too frequently to be unavailable. It really does feel as if I might as well be carrying punch cards around. When will the server be available? When will my job run? Who knows! It's surprising to me that there isn't more clarity, feedback, and instrumentation that might let me know when jobs will run and how long they might take. We had several virtual machines running research software and web sites that were providing services to external users.

Somehow, these VMs crashed in a manner that was not recoverable. This is simply not acceptable - it's hard to imagine a supercomputing center that can lose data and not have backups, but that is apparently what happened."

- Mostly my '3' ratings are 'neutral' because I don't use the particular service.
- Never use the "xdusage" command and do not use MyProxy or GSI OpenSSH to directly log into SPs.
- never used them
- no concern just do not use
- Not happy that I had to install an app on my phone (whose storage capability is limited) and that I have to have my phone handy to access the portal.
- not used
- Not used
- Not used, no issues..
- NSF needs to invest in more computing resources; NSF needs to make their long-term HPC strategy well known well in advance to allow everyone to plan; NSF must sustain the human support infrastructure
- only chose 3 because there wasn't a "do not use this resource" option
- please don't use acronyms in questions. I have no idea what SP is, there is no definition in this page, had to answer "never used it".
- Questions rated 1 are intended as N/A
- Rarely use these
- Services not evaluated I have not used (or am not aware of having used them)
- Software search is not very user friendly. Data is not consistent across SPs
- Sometime job waiting time is simply too long. Time for using debug nodes is too short for actual debugging.
- Sometimes the uncertainty in the job start prediction service is way too large to be useful. I've often gotten something like 1 hour +/- 36 hours on the Stampede2 development queue. That's mostly just confusing.
- ssh MFA is sufficient for me.
- TACC multi-factor auth is a pain. Needs to use google or other mainstream (mainstream being the keyword) 2-factor.
- The "single sign-on hub" may help in certain ways, but add extra layers for accessing the computing clusters. This is sometimes inconvenient.
- The job prediction service gives very high wait times.
- the single sign on hub does not always work
- The so-called super computer was less capable than my laptop. Couldn't echo characters. Batch jobs took hours to run (or worse). Essentially useless. I would do whatever I could to avoid taking a dependency on this service in the future.
- The throughput on Jetstream was too low for my application, and I was not able to resolve this in a timely manner with the support staff to use my past allocation.
- The Xsede portal does not do a great job saying what commercial/academic software is available.
- There are a couple of things that I have not heard about, and don't use.
- Those are items I did not use and there is no "N/A" option.
- Those are logon methods or software that I have not used.
- transferring data sometimes takes a long time and is not very convenient

- We have so far been unable to start instances on Jetstream from our (OSX/behind firewall) system. This has been very frustrating and has required complicated workarounds. Not laying blame, but that's been the experience.
- We haven't been able to run something on Jetstream that we're able to run on a desktop computer. We asked for help, but no one ever responded.
- What are SP resources?
- What does "SP" refer to?
- When I last tried to use Globus (admittedly a year or two ago), I found it fickle, and that it wouldn't always reliably transfer the files I wanted to transfer.
- "Whenever I transfer large files through scp, there would be cases of the archive getting corrupted. Sticking to Globus seems to prevent that issue. The only time I look at job estimation time to run is during extremely heavy load and I have a deadline, however, it doesn't seem to be accurate under that condition. It would show my job would take several days to run, but would then run a day or two sooner, which makes it hard to know whether I should use XSEDE resource to hit that deadline."

Comments to Question: Please share any comments you may have about the training opportunities offered by XSEDE (e.g., training topics important to you, training topics missing from the current offerings, preferred training delivery formats, depth of training offerings, etc.)

- A well written manual/book is fantastically underrated!
- Didn't use training
- GPU computing and programming, grant writing.
- Having the website include more of the general commands to use once you are logged on to XSEDE would go a long way in assessing my difficulties. Information on how to manage jobs and properly set up batch files could be detailed in greater depth. Additionally information on the proper places to store the jobs you are running can be useful for those just starting to access these resources
- I am very happy with the training & learning opportunities offered by XSEDE
- I can't find any hands-on training in New Jersey area. Please organize in our area.
- I could not possibly care any less than I already do about training opportunities through XSEDE.
- I do not use training opportunities. All I need is to be able to run my simulations, and that works to my satisfaction.
- I felt like the training opportunities were biased towards advanced users. This may be because my background is in organic bench chemistry, but It may be helpful to provide more introductory type trainings.
- I found the multi-cast workshops a very effective way to learn about the capabilities of new technologies. I believe this is knowledge is important because it provides a foundation on which to build future computational projects.
- I had a good time researching with the help of a local co-worker who acted as a Director of the Human Resource office. For his contribution, I put his name on the paper presented at the local meeting of the AAS.
- I had never heard about trainings before.
- I have only attended one training session held on my campus. It was good for giving me a view of what might be available for future work. It was a little hard since the people at the training all had very different skill levels, so we had to slow down a lot in a few places and then didn't get as in depth in other areas that would have been beneficial to the advanced users.
- I have participated in several Monthly Multi-Cast Workshops/Tutorials (with Local Moderator), which are fantastic. It would be helpful to be able to refer back to a recorded video of these because much of the critical information is provided by the presenter during presentation portions of the workshop.
- I have shared some of my thoughts on these issues with XSEDE staff, but to reiterate -- I desperately needed training, but somehow it didn't happen. In a sabbatical year, I had time to travel to learn how to use Comet. Luckily Mahidhar saved the day for me. I want to attend more training now that I have more time."
- I like recorded trainings and exercises that I can do at my own pace and time. With live training, it is sometimes hard to keep up online.
- I took an online training webinar on big data and deep learning from my office out in Boulder and it was a really helpful introduction. This is a great resource for the scientific community!

- I took one training class on Bridges when I worked at my former institution. I did not use XSEDE, I had access to all the resources I needed on my campus.
- I wish Monthly Multi-Cast Workshops can be made into video shared in XSEDE community after workshops. I am too far away from the location of workshops.
- I would be interested in material that teaches how to parallelize c++ codes with MPI for use with bioinformatics datasets
- I would have liked online training about getting started with the overall XSEDE environment, with using Jetstream (and even using Guacamole).
- If you don't have the resources to echo characters or run batch jobs in a reasonable amount of time, nothing else matters. You need to get your priorities right.
- I'm sorry but we have not used our Xsede allocation. We originally thought that we would need to use MAKER for gene prediction/annotation, but we've found that Blast2GO gives us what we need without the complexity of trying to get MAKER up and running.
- It is often disappointing that I cannot attend some of the training seminars that are of interest. For instance, the big data training seminar this coming month is not being hosted at my campus, which means I can't partake. Unless there is a means to watch these online later (which I don't believe is currently in place). It would be good if there was more open access to training seminars online.
- Looking forward to getting more involved in the training opportunities that XSEDE provides. I am planning to apply to be a Campus Champion at my institution.
- more documentation on Jetstream. It has a lot of capability but documentation lacks behind a lot. The helpdesk is very helpful, I think they should ask the people they help to write some documentation on how they setup a service and then post it online.
- Much to ponder, not enough time.
- Please provide open recordings available on the web of tutorial sessions. So many XSEDE workshops and so on are only available as webcasts at partner sites and I don't live near any of them!
- Recorded videos, webinars, and most importantly examples of codes are most useful.
- Recordings of live webinars, self-paced online tutorial, web documentation will be helpful for user as they can access the website and find the tutorial information when they have time and need.
- Some beginner-intermediate level training would be helpful. It seems like a lot of trainings are too hard
- Survey is too long
- The "in-person" trainings disadvantage folks who live a long way away from where these trainings usually occur.
- The copious web documentation is often too hard to parse to find the few relevant bits of info I am looking for.
- The current training classes are pretty good, but I think it is a shame that some classes fill up so quickly. Also, it might be nice to have a few, short (1 hr) special topic training sessions.
- The training opportunities have been excellent, but I cannot easily run our in-house developed software on systems that are not in-house.
- The trainings are often of interest to me, but they rarely fit into my schedule. Offering trainings that can be done at any time or watched after it is over would be much more helpful.
- the xsede website is hard to navigate. documentation and actual pages seem to be intermixed, the site is slow, selections that I make (edit users on which project) do not get stored, etc.

- There is much that is offered but again I use specific software - as an "end-user" I don't think these other features, though valuable, affect me.
- There's too many emails... Hard to keep track of what is actually important.
- Training is good in theory, but I greatly prefer working through things at my own pace.
- Training would be helpful, if I had access to the XSEDE supercomputing resources. But as a graduate student, I am not eligible to serve as principal investigator.
- We all love live and in-person training, but it does not reach or benefit most people
- We need more training offerings. I don't know where to start and advisor gives little guidance.
- With regards live training, they never seem to fit my schedule which is why I rate them all a neutral. the recorded ones are good to review, but if you have questions you are somewhat stuck.

Comments to Question: Do you have other comments to offer about how your work would be affected if the XSEDE environment did not exist?

- A number of my projects would not be accessible/achievable
- Access to GPU enabled HPC is fee-based at my university. As a junior faculty member with decreasing startup funds, having XSEDE as a resource enables research in my research lab.
- Before I did abandon some projects as not reasonable without access to computing support. Now I am in the process of examining what directions I could go in the future thanks to XSEDE.
- Egads, perish the thought! Everyone is either using XSEDE or a home cluster. My institution is tiny and tuition-drive. My work would all but perish without XSEDE resources!
- Having the opportunity to use these resources is without comparison. At this time, our discipline (business, finance) has not yet met the challenge of working with research problems large enough to move to XSEDE that aren't met with local resources. Looking forward to that time.
- High performance Computing is essential in my research.
- High performance computing is essential to my work, and XSEDE represents something like 2/3 of my group's work. This would adversely impact me, but also multiple graduate students and postdocs.
- I am a soft-money researcher, which means all my salary is paid through research grants. If XSEDE did not exist as a resource for NSF projects, I would need to include a budget in my proposals to NSF to pay for a similar service. That would mean I would have to dramatically reduce my salary support in my budget, which in turn would make it even more difficult for me to be able to sustain my research career. I would likely have to completely abandon my high-performance computing research and instead solely focus on field measurements. Such a change would dramatically lower my competitiveness in system science projects.
- I am at the beginning of an HPC journey. XSEDE has been critical to my development thus far and I see it as a critical component moving forward. Thank you so much and keep up the great work!
- I am forced to use other computational resources as I am not eligible to serve as principal investigator for any of the XSEDE resources. For instance, Microsoft Azure, Amazon web services, Nimbix, Penguin Computing, etc.
- I cannot do my current project without XSEDE. It's crucial!
- I cannot simulate a lot of large-scale simulations which some of my experimental collaborators would want, if the XSEDE does not exist.
- I did one training for using Bridges and did not otherwise use the XSEDE environment, so I may not be most suitable candidate for this survey.
- I do not have any other access to HPSc -- to me XSEDE is an essential resource
- I find the application process a bit crazy. It's essentially a 10 page NSF proposal for those without NSF funding. XSEDE is my sole means of computing since my university does not offer even a small computer cluster. I do appreciate the resources. However, I think we should move towards open access computing for researchers. Also, there has been mixed messaging. We are told to "just" get time on a big machine, but it's more difficult than one might think. So, it's all very frustrating.
- I have an education allocation, and the ability to educate my students about high performance computing and computational chemistry would be significantly impaired without XSEDE resources.
- I just want to comment that my group's access to Jetstream has been an absolute game changer in terms of total research capabilities, and number of projects which can be moved

forward in parallel. We (unfortunately) do not have many codes which can fully utilize 'massively parallel' resources such as traditional HPC, and often are severely constrained by the rigid structure of traditional HPC (with its walltimes, queueing systems, and inflexible environment) and my Jetstream allocation has enabled me to do very long-running and intensive analyses that I never would have been able to touch otherwise. Great work on creating a resource that expands XSEDE's reach into fields like mine! Whoo! :)

- I like to know that I have this resource as a backup in case my present compute platforms are not available, but so far, I have access to several HPC that serve my needs. However, working with the USDA ARS and our platform CERES, I am concerned that one day this system will be overloaded and/or obsolete without adequate infrastructure maintenance. If Xsede could complement CERES, that would be great. If this is something that Xsede would like to investigate, talk with Brian Scheffler at ARS (brian.scheffler@ars.usda.gov).
- I might never have been born... But in all seriousness, my projects would be a lot less cool since AWS costs a fortune.
- I never would have completed my project. Am very thankful that the XSEDE environment exists.
- I only have access to a single server with GPU, so XSEDE allows me to do work at a much bigger scale.
- I only used this for a class once so I'd imagine we would have done a different project
- I strongly recommend XSEDE exist to support people who are in a starting stage of their careers.
- I used GPU resources for training deep learning algorithms; without those resources the time required to complete the same work would increase at least by 1 or 2 orders of magnitude.
- I would be far less informed about core high performance computing methods and techniques.
- I would have to dedicate significant resources (which would significantly impact budgets on existing and future grants) to purchasing local HPC resources. It would be impossible to locally reproducing the kid of resources available on XSEDE.
- I would have to go back to proving theorems.
- I would have to pay for amazon cloud computing
- I would hope to complete my work with another resource, but if not it would take longer and some parts of the project could not be done.
- I would need to spend more funds to secure local computing resources.
- I would not be able to be various types of simulations for lack of software at local university cluster computer center.
- I would not be able to help students learn advanced tools.
- I would probably not perform some of the work
- If the XSEDE environment did not exist I would not have gained the expertise that I now have in doing bioinformatics. The XSEDE environment helped get started by affording me access to HPC resources and to an ECSS team. After gaining confidence after using XSEDE resources I have found it easier to forge ahead and be persistent in requesting for access to local resources. However, our local resources have also improved since I submitted my application for a start-up grant. I am of the opinion that the XSEDE environment will continue to be beneficial for me.
- I'm a very 'niche' user, and I'm not even sure that I'll use XSEDE going forward.
- It is fantastic that these resources are available. As faculty at an undergraduate institution, it is becoming increasingly difficult to get funds to buy computers for computational research. Administration refuses to accept computers as instruments.

- It will kill my research!
- It would be horrible is XSEDE were to vanish.
- It would cost more!!
- It would take too much time out of my life to do without XSEDE.
- It's very difficult to find local supercomputing resources that are free of charge to the PI and based on a peer-reviewed system for allocation awards. Without XSEDE I would have not been able to accomplish most if not all of my research goals. As a result, I would not be in the position of research faculty where I am today.
- I've spent most of my PhD thesis logged into an XSEDE resource. To say XSEDE has been essential to me is an understatement.
- My current research project would not exist without XSEDE.
- My exploration of unstructured protein dynamics and regulation by phosphorylation would not be possible without XSEDE resources.
- My long-term career goal is to teach and do research at a primarily undergraduate institution, where the ability to host local high performance computing services is severely limited in respect to that of R1/R2 school. Loss of the XSEDE environment would not only harm my application profile by reducing the scope of my research, but it would also harm the development of my future students. Without environments like XSEDE, these students would lose the ability to experience competitive research first-hand, and their opportunity to contribute the field at large would be significantly restricted.
- My university does not have computing resources and my computational research completely relies on XSEDE resources.
- My work depends crucially on the availability of XSEDE resources. Without it, I would never have started my current line of research.
- Nearly all of my research would not be possible. We rely very heavily on XSEDE resources to both run simulations and develop our code so it works on various different environments and CPU architectures.
- New Jersey Institute of Technology (NJIT) doesn't have good computing facility. We have a cluster here called 'Kong Cluster'. Even if we submit a small job, it takes a significant amount of time. For example, a system with only hundred atoms sometimes takes a week just for relaxation calculation in VASP. Hence for the kind of projects we have been working, it takes a week or more just for a simple calculation. Moreover, NJIT computing facility can't handle many jobs at the same time. We can only submit two-three jobs at a time. It might take many years to improve the computing facility here at NJIT significantly. Apart from this facility at NJIT, we don't have any other facility (except XSEDE). The current NJIT cluster is not designed for advanced research. It is mainly designed for educational purpose. All our projects are computational. Without good computational resource, we are not able to make any progress. Without XSEDE, our research is dead.
- NSF must continue to support XSEDE for the long term
- Our local HPC resources are nowhere close to those of XSEDE. Without XSEDE, the work we are doing would have to be drastically reduced in terms of scope and scientific impact.
- Our project is very much dependent on the XSEDE resources. We have been using Teragrid/XSEDE resources for number of years and it is getting increasingly difficult to obtain to obtain even modest resources.
- Please don't let it happen.
- Since being a Campus Champion is part of my role in applications support, XSEDE plays a critical part in my ability to assist researchers at the university.
- Since I'm an XSEDE staff, without XSEDE, I would be working probably elsewhere...
- Survey is too long

- The annual proposal is incredibly burdensome. I have NSF projects with 3+ years of funding. Having to resubmit proposals for computing resources every year is an unfortunate time sink. I have sought other resources for this reason. XSEDE has been a great resource, but annual re-proposing is a time sink stifling my productivity."
- The cloud computing and storage resources provided to our NSF-funded project have been absolutely essential. Multiple university PI's participated in this project. They greatly benefited from being able to access VM's on Jetstream on which numerical weather prediction model verification tool software was installed, and were able to access data stored on Wrangler-IU both via the Jetstream nodes and their own local computing systems.
- The large memory capability of Bridges is unique and our assembly jobs of large metagenomes completely depend on it!
- The main effect is that I would have to use our campus cluster more, likely by paying for more nodes.
- The scale and quality of the XSEDE resources is invaluable. Some of our simulation (heavy CFD) could not be done on standard university grade resources.
- The use of XSEDE/TeraGrid resources for my research in computational physics between fall of 2007 and summer of 2014 was essential for my research productivity (number of and depth of content in publications). That training, work experience and online training materials and compute resources were also essential for me to be able to create graduate level courses for physics majors in parallel computing in spring/fall 2016 and fall 2017. XSEDE training workshops such as at SDSC summer 2016 eased my transition to data science and big data tools which opened up a new career for me outside academia (fall 2017).
- There is always an alternative!
- This resource has definitely reduced our time to science, and eased our stressed allocation on more traditional HPC systems. By using Jetstream we have been able to process work we might not otherwise have been able to, or at least we have been able to concentrate on simulations on the traditional HPC system, and analysis on the cloud.
- This two day limit of runs for my work which needed very long runs was not efficient. I finally found a resource and switched to using it.
- This was a great opportunity for me as I could do my work in a more efficient and faster way. And I hope to have continued access to XSEDE as I am planning to expand my work based on the added resources of XSEDE.
- Throughout the last 7 years, GPU resources have gone up and down significantly -- with limited resources for large throughput simulation using GPU resources. We have had to shift to TITAN or Blue Waters for those kind of applications -- but TITAN is not a very good fit for Biological Molecular Dynamics Simulations and Blue Waters will go off line in the near future. We need more resources like XStream to make this area of research possible."
- We are currently using XSEDE (and one commercial cloud provider) as a pilot project to see if our seismic research workload would fit into a shared/cloud environment instead of hosting all of our own infrastructure. If we didn't have XSEDE, we would probably have to go with a second commercial vendor for this particular project, which might have been cost prohibitive.
- We have projects that not only require XSEDE resources but we have requested and received special queuing that allows us to do run weather forecast models in real-time so that their utility may be evaluated by weather forecasters and researchers in real-time without being biased by knowing what actually occurred, a true test of utility as guidance. Over the years several XSEDE and Teragrid centers have helped in this effort, most recently

TACC and SDSU. This research is contributing to updates and plans of the US National Weather Service for direct benefits to the US citizens paying for XSEDE resources.

- We need more seminars so soft disciplines cab understand how to use these valuable resources.
- We used your service for a summer workshop. If you didn't claim to have a solution for us, we would have found a better solution.
- We wouldn't be able to do some a huge project that we want to do.
- Why not use science gateways to connect researchers to improve collaborations and enhance interdisciplinary views?
- Without XSEDE, the amount of data I could collect would greatly decrease and the amount of time to run the experiments would increase. XSEDE is a very important to what I do.
- Would try to obtain similar resources elsewhere but my work would be crippled.
- XSEDE computing facilities are critical to the numerical-based research that I carry out. My institution does not have comparable computing facilities for high-performance computing. Without access to the XSEDE facilities, some of this research would be stalled or perhaps discontinued, if I were unable to find and obtain other facilities available to US researchers.
- XSEDE has been essential for many of my projects, as we are analyzing enormous amounts of data. Not only that, members of my lab have been greatly benefitted from XSEDE resources. My postdoc has used XSEDE during his PhD career in 2012 (Stampede, Ranch, Ranger), at his first PostDoc in 2015 (Stampede, Ranch), and now as a PostDoc in my lab (Comet, Stampede, Oasis).
- XSEDE is an essential and integral component of my research. I could not do it without these resources.
- XSEDE is an incredible resource. Half of my PhD thesis would not have been possible if I did not have access to XSEDE.
- XSEDE is brilliant as it provides computational resources to run parallel codes to all researchers, even beginners. It is very useful for people who don't have access to resources in their individual institutions. My project would not have been possible without a cluster and Comet did the job perfectly.
- XSEDE is essential. I really wish that the allocations could be higher. These resources are incredible.
- XSEDE is extremely helpful for the resources it provides. The specific form of resources (e.g. parallel processing on instances that can be launched easily, with mounting to local volumes) can be improved, as can the website (slow reaction times, not initially obvious where to click) and the award process can be streamlined. Overall, grateful for the service, and especially grateful for the human IT support when things are difficult (even when problems can't be solved). Thank you, XSEDE!

E.